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GEOPHYSICAL ABSTRACTS 120

JANUARY - MARCH 1945

COMPILED BY

W. AYVAZOGLOU AND V. SKITSKY

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 120
January - March 1945[1]

Compiled by W. Ayvazoglou[2] and V. Skitsky[2]

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FOREWORD

Geophysical Abstracts 1 - 86 were issued in mimeographed form by the Bureau of Mines; Abstracts 87 - 111 were published in bulletins of the Geological Survey; Abstracts 112 - 119 were issued in mimeographed form by the Bureau of Mines as Information Circulars 7256, 7257, 7267, 7273, 7285, 7292, 7303, and 7310.

1. GRAVITATIONAL METHODS

7786. Barton, D. C.[3] Case Histories and Quantitative Calculations in Gravimetric Prospecting. Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1760, 1944, 49 pp.

Four papers compose this publication: (1) Gravity anomalies of Nash and Damon Mounds, Fort Bend and Brazoria Counties, Tex.; (2) Lost Hills, Calif. - an anticlinal minimum; (3) Gravity minimum at Tepetate on very deep salt dome, Acadia Parish, La.; and (4) Quantitative calculations of geologic structure from gravimetric data. The first three papers are case histories of individual geophysical prospects subsequently tested by drilling. They deal with local geology, methods of gravitational surveying, specific-gravity relations, anomalies, maxima-minima, special local features, and interpretation. The fourth paper presents several calculations of the subterranean mass causing an observed anomaly. The instances considered are determinations with regard to the cap of salt domes, the salt core, and the position of the crest of a structure. In an introduction to the publication, Paul Weaver stresses the author's contributions to a quantitative approach in exploration problems. Numerous maps, profiles, and tables illustrate the four papers. - V. S.

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[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgement is used: "Reprinted from Bureau of Mines Information Circular 7324."

[2] Physical science analytical editor, Bureau of Mines, U. S. Department of the Interior.

[3] Prepared for publication by Paul Weaver, after death of author.

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7787. Boaga, Giovanni. Su un programma di ricerche geofisiche in Toscana per l'individuazione di giacimenti metalliferi (Concerning a Program of Geophysical Investigation in Toscana for Finding Metal Ore Deposits). Geofis. pura appl., Messina, vol. 2, 1940, pp. 153-158.

The advisability of using gravitational measurements for determining the location of metal ore deposits in Toscana, Italy, is considered. The Bottino region is favored above others. The discussion is based on the geological characteristics of Toscana. The physical properties of certain ores are also taken into account. Particular attention is devoted to lead, zinc, and antimony. - V. S.

7788. Brant, A. A. Gravimetric and Magnetic Geophysical Surveys in the Gas Fields of Southwestern Ontario, 1941 and 1942. 52d Annual Report of the Ontario Department of Mines, vol. 52, part 5, 1943, Toronto, 1945, pp. 73-88.

A gravimetric survey was made in southwestern Ontario by several gas companies before 1941. The data obtained were amplified further by a vertical-intensity magnetic survey conducted by the author in the same areas in 1941-42. The rock's specific gravities and magnetic susceptibilities were also measured, to determine the nature of observed anomalies. This combined material is analyzed, with presentation of contour maps, profiles, and other data. Conclusions are reached on the causes of anomalies and the structure of the basement. In their light, three parts are distinguished with regard to gas in the area surveyed: (1) The productive Malahide, Brownsville, Middleton, and Port Burwell areas, where the fields are grouped on the steep flanks of a deep syncline; (2) the barren area north, northwest, and west of this, which is situated on a high, apparently rigid plateau of the basement; and (3) the Essex-Kent-Lambton area, where the Paleozoic structural forces have been much greater than elsewhere and the basement has yielded. - V. S.

7789. Goudey, Raoul. Mesures de l'intensité de la pesanteur en France pendant l'année 1941; 2-e série (Measurements of the Intensity of Gravity in France During the Year 1941; 2d ser.). Compt. rend. Acad. Sci., Paris, vol. 215, 1942, pp. 458-459.

Gravity measurements were made in the east of Montauban and the northwest of Albi during September and October 1941. This region contains the dome of Grésigne. The Holweck-Lejay pendulum instruments were used. The data are tabulated. - V. S.

7790. Graf, Anton. Ein neuer kleiner Schweremesser (A New Small Gravimeter). Beitr. angew. Geophys., Leipzig, vol. 10, 1942, pp. 18-34.

The former model of the gravimeter of Askania-Werke, Berlin, has been developed into a new and lighter instrument. The entire equipment weighs now about 30 kg. Its precision exceeds 0.1 mgal. Transportation can be made by means of any vehicle or carrier. - V. S.

7791. Haalck, H. Welche gravimetrischen Bestimmungsstücke ergeben durch die Darstellung ihrer örtlichen Verteilung das deutlichste Bild von den die Schwerestörung verursachenden Dichteungleichheiten im Untergrund? (What Means of Gravimetric Determination Show, Through a Presentation of the Local Distribution, the Clearest Picture of the Differences of Underground Density Causing the Gravity Anomaly?). Beitr. angw. Geophys., Leipzig, vol. 10, 1943, pp. 130-146.

A comparison is made between the first three vertical derivatives of the gravity potential, given in terms of isanomalies, and the customary representation of torsion-balance measurements by means of gradient arrows and curvature-value lines. The vertical derivatives in question are: Gravity acceleration W_z, and the vertical gravity gradients W_{zz} and W_{zzz}. The comparison shows that these derivatives give a better insight into underground conditions than the gradient arrows and curvature values. Among the derivatives, the vertical gradient W_{zz} has the smallest precision. As regards the reference of the derivatives in depth, W_{zzz} gives, above all, information concerning superficially disposed differences of density; W_{zz}, about difference at intermediate depths; and W_z, about deeplying densities. - V. S.

7792. Kawabata, J. Seismic or Volcanic Zone and the Deflection of the Vertical. Jour. Meteorol. Soc. Jap., Tokyo, vol. 17, 1939, pp. 320-325.

In this preliminary note the writer suggests the fact that the deflection of the vertical, referred to the reference ellipsoid which approximately represents the geoid surface in the regions concerned, is not only very large in its absolute values but also very systematic and regular in direction in the districts where the seismic or volcanic activity is violent. - Author's abs.

7793. Kogbetliantz, E. G. Quantitative Interpretation of Magnetic and Gravitational Anomalies. Geophysics, Menasha, Wis., vol. 9, No. 4, 1944. pp. 463-493.

A new interpretation method for gravitational and magnetic anomalies based on the use of average values (integrals) of suitably chosen functions of the observed quantity is discussed and illustrated by application to the particular case of a symmetric anticline. The quantitative interpretation yields the position of the apex, the slope of the sides, the thickness, the depth of the base of the anticline, as well as the density contrast for the gravitational case and the magnitude and direction of the magnetization vector for the magnetic case. - Author's abs.

7794. Prey, A. Bemerkungen zu Preys Reduktion der Schweremessungen (Remarks Regarding Prey's Reduction of Gravity Measurements). Gerlands Beitr. Geophys., Leipzig, vol. 56, 1940, pp. 223-225.

Prey's reduction of the values of gravity measurements is briefly explained. It consists in referring the observation point to the geoid, while leaving the distribution of masses unchanged. Next, the application of free-air anomalies to the calculation of geoid undulations is critically examined. Theoretical objections arising because of dislocations of the geoid are indicated. The practical usefulness of free-air anomalies is demonstrated by the formula derived by means of spherical functions by the author and H. Jeffreys. In turn, the application of Prey's reduction to the calculation of geoid undulations is discussed. The small extent of undulations in this case is explained. Finally, the concept of niveau-spheroids is shown to be open to objections. - V. S.

7795. Razdymakha, G. S. An Experimental Model of a Gravimeter with Minimum Quartz Pendulums Constructed by TsNIIGAiK (in Russian). Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros'emki i Kartografii GUGK pri SNK SSSR, Sbornik 7, Issledovaniia po Gravimetrii, Moscow, 1941, pp. 49-81.

The general gravimetric survey of the U.S.S.R. requires instruments of high precision. Accordingly, the Central Scientific Research Institute of Geodesy, Aerial Survey, and Cartography (TsNIIGAiK) has endeavored to develop a field pendulum-gravimeter that would meet the strictest requirements. The experimental model is described and illustrated by drawings. "Minimum" pendulums of a half-second cylindrical type were used; they are generally regarded as superior to those of Sterneck-Stückrat. These pendulums were made of fused quartz which has a more stable molecular structure than other material. Each pendulum consisted of only two parts, the body and the knife. Special arrangements insured setting the pendulums in identical positions on the supporting surfaces. The pendulums and related parts were contained in a vacuum, within a copper cover. When they were not in use, a lock held them in a fixed position. Two principal problems are involved in the construction of this apparatus: The advantages and limitations of minimum pendulums and the dependence of the period of pendulum oscillations on the shapes of the knife edge and supporting surface. These problems are treated mathematically. The model was tested, and the results are presented. The oscillation stability of quartz pendulums is considered to be demonstrated. - V. S.

7796. Roever, W. H. The Weight Field of Force of the Earth. Washington University Studies - New Series, Science and Technology - No. 11, St. Louis, 1940, 84 pp. Price, $1.50.

The gravitational field of force differs from the weight field of force in that the former is referred to axes fixed in the earth whereas the latter is referred to an absolute inertial system. The gravitational force must be augmented by the centrifugal force due to the rotation of the earth in the stellar system, to produce the weight force. For a body in motion with respect to the earth, considered in stellar space, other accelerations enter, causing a compound centrifugal force, evidenced in many unusual phenomena observed only when great precision of observations is attained. For example, in the Northern Hemisphere, a projectile deviates to the right and cyclones rotate counterclockwise; in both hemispheres the Foucault pendulum oscillates in a plane which rotates with reference to the earth.

The geoid, defined as the surface of a calm ocean interlinked with water-level canals, approximates an ellipsoid whose oblateness is due about equally to rotation and mass distribution. Locally, this geoid is also affected by mountains or depressions; and the deviation of the geoid, or a level surface, from a spherical form is measured by the extreme curvatures of the level surface at the point. Hence it is futile to seek a mathematical expression for the potential function of the weight field of the entire earth.

By chapters, a mathematical discussion is given of: (1) Laws of relative motion, both as to velocity and as to acceleration. (2) Velocity and retardation in an atmosphere. (3) A localized particle of negligibly small mass on an earth rotating in the stellar system. (4) Tides, precession and nutation. (5) Geodetic problems: potential functions of the weight field, weight field at rest with respect to the solid earth, curvatures of the lines of force and torques acting on the Eötvös torsion balance. (6) Reduction to coordinate analysis of preceding chapter. (7) The differential equations of the motion of a projectile with solution for lack of air resistance and simplified potential function. Solutions are given for the time of flight, range and drift, in general and in terms of initial velocity and direction. The method of differential corrections is summarized. (8) Path of a baseball and surface of a liquid on a turning table: the simple conical pendulum.

Because of its mathematical nature and the concise and precise style, the original paper should be consulted for details. - I. Roman.

7797. Ruedemann, Rudolf. The Hudson Valley Belt of Graptolite Shales and Negative Anomalies of Gravity. Am. Jour. Science, New Haven, Conn., vol. 242, No. 7, 1944, pp. 391-396.

In reference to Longwell's paper on the Geologic Interpretation of Gravity Anomalies in the Southern New England-Hudson Valley Region the writer points to the great thickness of the graptolite shales reached and the great depth of the geosyncline indicated by the radiolarian fauna

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and suggests that the Levis trough with the graptolite beds may have been the central portion of a mediterranean sea, the shallow littoral portion of which was formed by the adjoining so-called Chazy and eastern troughs. The great thicknesses of the westerly adjoining Schenectady and Canajoharie beds are considered as partly explained by the northwest swing of the negative isanomalies in the Mohawk Valley and partly as a secondary effect of the strong sedimentation in the adjoining geosyncline. - Author's abs.

7798. Thyssen, S. von. Über die mögliche Beeinflussbarkeit der Drehwaage durch Grundwasserschwankungen (Concerning the Possible Influence of Ground-water Shifts on the Torsion Balance). Ztschr. Geophys., Braunschweig, vol. 17, 1942, pp. 279-281.

A varying distribution of ground waters can affect torsion-balance measurements. Several examples are given to show that under certain conditions shifting ground waters have so markedly influenced gravity gradients and curvature values as to render their validity doubtful. Accordingly, the interpretation of torsion-balance measurements should take into account the condition of ground waters. - V. S.

7799. Vening Meinesz, F. A. Gravimetrical Observations at Sea: Theory and Practice (in Russian). Izdatel'stvo Geodezicheskoi i Kartograficheskoi Literatury G.U.G.K. pri S.N.K. S.S.S.R., Moscow, 1940, 324 pp.

In this book are collected Russian translations of the author's papers on gravimetric measurements at sea: (1) The theory and practice of pendulum observations at sea, Delft, 1929; (2) Gravity expeditions at sea, 1923-30, Delft, 1932; and (3) Gravity expeditions at sea, 1923-32; with the collaboration of J. H. F. Umbgrove and P. H. Kuenen; Delft, 1934 (see Geophys. Abs. 57, No. 1756; and Geophys. Abs. 75, No. 2613). In an appendix are added translations of papers: (1) B. Brown: Measurement of the force of gravity at sea; (2) F. A. Vening-Meinesz: The disturbing member of 2d order in pendulum observations at sea; and (3) F. A. Vening Meinesz: The disturbing member of 2d order (corrective member of Brown) in pendulum observations at sea. The text includes gravimetric profiles and maps. The book contains an introduction by Prof. P. M. Gorshkov, editor. - V. S.

7800. Weiss, Oscar. Report on the Geophysical Survey at Inhaminga. Incorporated in: Putnam, L. G., and Weiss, Oscar, Geological and Geophysical Report on the Inhaminga Structure Near Inhaminga, Portuguese East Africa, May 1935 (deposited in typewritten form in the Geological Survey library, Washington, D. C.)

The author has made gravimetric and seismic surveys in the Inhaminga (Inyaminga) area in 1934 and 1935. This area lies in Portuguese East Africa about midway between Beira and the Zambesi River. The problem was to determine the highest part of a supposed anticline in the Inhaminga geological structure and to find suitable sites for drilling. The gravimetric survey was carried out with the Jones-Shaw gradiometer measuring the horizontal gravity gradients; the seismic survey, with Jones' microid seismographs. The work is described. The results showed that no anticline exists and that the geological structure in question is a part of a large and dipping block terminated by a broad fault zone. These findings have led the author to caution against exaggerated expectations of oil and to advise the drilling of one deep borehole. (See also abs. 7897 in this issue). - V. S.

2. MAGNETIC METHODS

7801. Berstein, I. Sur un phénomène d'induction dû à l'interaction de champs magnétiques perpendiculaires (Concerning an Induction Phenomenon due to the Interaction between Perpendicular Magnetic Fields). Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 43, No. 9, 1944, pp. 380-382.

A new-type magnetometer has been developed by the author. It is based on an induction phenomenon observed in perpendicular magnetic fields. The magnetometer consists of a rectilinear ferromagnetic wire stretched across a coil and placed in a constant magnetic field. The direction of the wire is perpendicular to the coil's winding but parallels the magnetic field. In such an arrangement, an alternating current passed through the wire generates an alternating electromotive force in the coil. This would not be the case if the relationship between the induction and the field in the wire was linear, because the flux passing through the coil would not vary. Alternation results from a nonlinear interaction between two perpendicular magnetic fields; namely, the variations of the transverse component of the field generated by the electric current produce variations in the longitudinal component of the induction created by the constant longitudinal field. A mathematical theory is developed in explanation. It is based on the assumptions that the magnetic properties of the wire are identical in all directions and that hysteresis can be ignored; the wire is supposed to be isotropic. The magnetometer is called the "Oerstedmeter". - V. S.

7802. Bossolasco, Mario. La distribuzione del campo magnetico terrestre all'isola di Stromboli (The Distribution of the Earth's Magnetic Field on the Island of Stromboli). Geofisica Pura e Applicata, Messina, vol. 5, 1943, p. 11.

A report is presented on magnetic measurements made on the island of Stromboli during 1940. Vertical and horizontal compenents were determined at 218 stations. This survey revealed exceptionally strong anomalies exceeding 5,000 gammas at times. They are attributed to past and recent volcanic activity. - V. S.

Brant, A. A. Gravimetric and Magnetic Geophysical Surveys in the Gas Fields of Southwestern Ontario, 1941 and 1942. 52d Annual Report of the Ontario Department of Mines, vol. 52, pt. 5, 1943, Toronto, 1945, pp. 73-88 (see abs. 7788 in this issue).

7803. Davids, Norman. Calculation of Vertical Component (Z) for Potential Fields from Observed Values of Declination (D) and Horizontal Intensity (H). Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 239-242.

The author considers a magnetic vector field derivable from a scalar potential; the part of the field originating from sources inside the earth is supposed to be known. In such a case the values of the three components D, H, Z are not independent. There exists a functional operator by means of which any one of the functions can be calculated from the other two. Since in practice D and H are usually determined with much greater accuracy than Z, knowledge of this operator would make it possible to compute Z from D and H in uncertain regions. The author presents the derivation of a formula for the operator and gives a trial computation of Z for an eccentric-dipole field. - V. S.

7804. Fleming, J. A. Summary of the Year's Work, to June 30, 1944, Department of Terrestrial Magnetism, Carnegie Institution of Washington. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 245-250.

During the year July 1, 1943, to June 30, 1944, practically the entire staff of the department continued to work on war problems. Still, geomagnetic progress was good because much of such research could be made with the theoretical and instrumental material accumulated in previous years. The reported activities are reviewed under the following headings: (1) Geomagnetic investigations, (2) terrestrial electricity, (3) ionosphere, (4) nuclear physics, (5) observatory and field work, and (6) publications. - V. S.

7805. Fleming, J. A., and Scott, W. E. List of Geomagnetic Observatories and Thesaurus of Values, VI-VII. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, Nos. 3-4, 1944, pp. 199-205, 267-269.

Table 1, Annual Values of Geomagnetic Elements at Observatories, is continued. Comments are added in pt. VI on the improvement of recording and the reduction of data at magnetic observatories. - V. S.

7806. Galbraith, F. M. The Magnetometer as a Geological Instrument at Sudbury. Amer. Inst. Min. Met. Eng., New York, Tech. Pub. 1482, 1942, 6 pp.

This paper describes the use of the magnetometer, under geological direction, in exploration of the Sudbury nickel district. The writer's experience at Falconbridge has led him to the belief that only through detailed work, and by careful correlation of both geological and geophysical results, can geophysical prospecting methods be applied successfully to mining exploration problems. It is hoped that the basic technique described in the paper will be found to have general application. - Author's abs.

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7807. Halet, R. A. Malartic Mine Was Found by Scientific Exploration. Eng. and Min. Jour., New York, vol. 145, No. 6, 1944, pp. 88-91.

The Malartic gold ore body is buried deeply beneath a heavy clay overburden in northwestern Quebec. Its discovery was difficult because less than 5 percent of the bedrock outcrops in this region. Prospecting started in 1925 and detected an ore body, but work was discontinued because the ore seemed unprofitable. In 1934 a magnetometer survey was made east of the previous discovery. It located an ore-bearing formation which was obtained by diamond drills in 1936. This ore has been exploited by the East Malartic Mines, Ltd., and the Malartic Gold Fields, Ltd. To the end of 1942 the mine has produced over $5,000,000 in gold. The geology of the area is described. - V. S.

7808. Hirayama, M. On the Diurnal Variation of the Earth's Magnetic Field (in Japanese, with an English summary). Journ. Meteorol. Soc. Japan, Tokyo, vol. 17, 1939, pp. 55-56, 118-140.

The magnetic field caused by the oscillation of the atmosphere is calculated from fundamental equations; the results obtained on the electromagnetic field in the ionized layer are taken into consideration. As a result, it is shown that, when the oscillation is similar to that observed at the earth's surface and the numbers of electrons and ions are not much different, the current in the layer of a mean height about 110 km. gives the observed amplitudes of the magnetic field fairly well. In a layer with large conductivity, the magnetic field can be considered to change with the same period as the oscillation, because the variations with other periods are negligibly small. - Y. Kodaira, Ztrbl. Geophys. Meteorol. Geodäs., vol. 5, 1940, p. 19.; condensed by V. S.

7809. Johnson, M. E. Prospecting for Iron Ore in New Jersey in 1943. Skillings' Mining Review, Duluth, Minn., vol. 33, No. 20, 1944, pp. 1-2.

Numerous dip-needle surveys of iron ore have been made in New Jersey during 1943. Most prospects were disappointing. Some favorable indications were found in Morris County. The work showed a need of fairly detailed magnetic surveying before core drilling because the general information is seldom sufficient or reliable for selecting drilling sites. - V. S.

7810. Johnston, H. F. Mean K-Indices from Twenty-Seven Magnetic Observatories and Preliminary International Character-Figures for 1943. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 255-260.

Tables are given with explanatory text. - V. S.

Kogbetliantz, E. G. Quantitative Interpretation of Magnetic and Gravitational Anomalies. Geophysics, Menasha, Wis., vol. 9, No. 4, 1944, pp. 463-493 (see abs. 7793 of this issue).

7811. Maurain, Charles, and Coulomb, Jean. Sur les perturbations magnétiques en baie (On Magnetic Disturbances Recorded in the Form of Loops). Compt. rend. Acad. Sci., Paris, vol. 216, Nos. 9-10, 1943, pp. 273-276, 327-329.

A statistical study has been made of magnetic disturbances forming loops on the curves of recording apparatus. These disturbances were studied previously by several authors. The present investigation is based on observations made near Paris during 1883 to 1941. The large volume of data made it possible to select only typical cases and yet to employ statistical methods. Three categories of disturbances were distinguished in the chosen material: (1) PB.1, duration less than 15 min.; (2) PB.2, duration between 15 and 30 min.; and (3) PB.3, duration longer than 30 min. In the analysis, PB.2 proved to be insignificant and were discarded. The results for PB.1 and PB.3 showed that these categories possess different statistical properties and are probably due to different types of sun radiations. The present paper deals with the diurnal and annual distributions of the magnetic disturbances classed in category PB.3. The correspondence between this category and sun declination is analyzed. - V. S.

7812. Ol, A. J. Solar Activity and Geomagnetic Perturbations (in Russian). Bull. (Izvestiia) Acad. Sci. U.R.S.S., Moscow, Sér. Geogr. Geophys., No. 6, 1943, pp. 359-374.

In 1937-41 there was developed a statistical approach to the theory of the impulse character of solar activity. This approach has been used by the Pulkovo Observatory in its investigations of the relationship between solar activity and geomagnetic disturbances. Some preliminary results are presented. It is found that the geomagnetic field is affected mainly by the distant positive phases of solar impulses, and less so by their zero phases. This observation can serve for forecasting magnetic disturbances. Other results are given. - V. S.

7813. Procopiu, St. Mesures magnétiques en Roumanie, en 1938: La déclinaison magnétique et la composante horizontale. (Magnetic Measurements in Rumania in 1938: Magnetic Declination and the Horizontal Component.) Compt. rend. Acad. Sci. Roumanie, Bouchareest, vol. 3, 1939, pp. 284-292.

An absolute determination of elements of the terrestrial magnetic field was made in Rumania in the summer of 1938. 20 stations were established in different provinces. The author measured declination and the horizontal intensity. The data are tabulated. They show that the magnetic declination has everywhere eastern values; these lie within the limits of 0°20' in Wallachia, and within 1° 48' in Dobruja. The horizontal intensity attains its highest value of 0.23398 CGS in Cavarna, Dobruja, and its lowest value of 0.21739 CGS in Bîrlad, Moldavia. The presentation of data is accompanied by geological observations. - V. S.

7814. Pushkov, N. W. Geophysical Work in the Union of Soviet Socialist Republics. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 276-277.

A brief letter summarizes geomagnetic work in the U.S.S.R. The Institute of Terrestrial Magnetism was founded in 1940. Gradually, the following sections were established: survey on land, survey at sea, superintendence of magnetic observatories, cartography, ionosphere station, theoretical investigations, and some others. Before the war, the institute took measures to establish magnetic standards, compare the instruments of observatories, forecast magnetic disturbances, etc.; surveys were chiefly conducted in the western part of the country. During the war, the sections of the institute were moved to the observatory at Vysokaia Dubrave near Sverdlovsk. Regular observations were continued, new types of instruments were constructed, preparations were carried out for spectroheliographic and cosmic-ray-intensity work, several expeditions were sent to study magnetic anomalies connected with mineral deposits, etc. At present, the institute conducts the magnetic and ionospheric services of the U.S.S.R. - V. S.

7815. Rougerie, Paul. Sur la direction de l'aimantation terrestre (on the Direction of Terrestrial Magnetization). Compt. rend. Acad. Sci., Paris, vol. 216, No. 13, 1943, pp. 451-452.

J. Coulomb has previously shown that the position of an apparent north pole P_m of a uniform terrestrial magnetization reproducing the observed field can be determined by means of the data of a single magnetic station. The author now calculates the geographical coordinates of the boreal pole P_m for each of 65 stations operated during the International Polar Year 1932-33. This calculation reveals a certain dispersion of the computed poles. In the dispersion six groupings can be distinguished, with average geographical positions corresponding to Europe, continental Asia, China and Japan, North America, South America, and Australia. A seventh group comprises poles corresponding to magnetic stations of high latitudes. An examination of these groupings discloses that the inclination of the magnetic axis to the rotation axis of the earth varies from one continent to another; the angles of inclination are given. Futhermore, in the Northern Hemisphere, projection of the magnetic axis on the equatorial plane moves from the west to the east as the latitude of stations diminishes. In the Southern Hemisphere, no such movement is observed and the projection seems to be stable. - V. S.

7816. Schwinner, Robert. Was kann die remanente Magnetisierung von Bohrkernen bedeuten? (What Can the Residual Magnetization of Borehole Cores Mean?). Ztschr. deutsch. geol. Gesell., Berlin, vol. 94, 1942, pp. 324-326.

H. Reich has shown that the residual magnetism of borehole cores can be very considerable and is, moreover, subject to large variations. This observation would render magnetic measurements in boreholes very uncertain. In objecting to Reich, the author points out that the residual magnetism in question can result from the process of boring. The cores may be heated thereby up to and beyond the Curie point. Such a temperature would change not only the magnetic properties but also the structure of rocks. The subsequent cooling would produce in the cores a magnetization of their own. This magnetism would be affected not only by the magnetic field of the surrounding ground but also by that of the borehole equipment. The author thinks these considerations refute Reich's viewpoint. - V. S.

7817. Spiroff, Kiril. Dip-Needle Survey of Wyandotte-Winona Area, Houghton County, and Cherokee Area, Ontonagon County. Michigan Dept. Conserv., Prog. Rept. 7, 1941, 17 pp.

The dip-needle survey has established that belts of rock, both flows and conglomerates which elsewhere have produced the greatest amounts of copper, cross the Cherokee area, and their positions are located. These important zones have not been explored by the drill or by shaft, but it is believed they represent favorable ground for future prospecting. To emphasize this point, a diagrammatic cross section of the Keweenawan series has been prepared. It shows the zones of rock in which the great copper lodes are localized from place to place, and the relative value of copper produced from each. The large map accompanying this report shows the key-horizon markers of the Keweenawan series from the Keweenaw fault to the outer conglomerate, and also sites of exploration and certain physiographic features. - Ann. Bibl. Econ. Geol. 1942, vol. 15, No. 2, 1943, p. 264.

7819. Thyer, R. F. Report on the Geophysical Surveys at the Wallaroo-Moonta Copper Field. South Australia Department of Mines, Mining Review, Adelaide, No. 77, 1942, pp. 41-48.

Electrical, magnetic and electromagnetic surveys were conducted over certain areas of the Wallaroo-Moonta copper field, South Australia. (1) The electromagnetic survey proved to be the most effective and was used extensively. The method employed is described. The results showed the existence of a large number of electrically conductive zones of varying degrees of conductivity. A comparison of their effects with the effects obtained over known lode shears has lead to the conclusion that the majority of the observed zones are likewise lode shears. Therefore, a drilling program was outlined. (2) The magnetic survey indicated very strong anomalies in the vicinity of the Devon mine. Vertical magnetic intensities rose to over 6,000 gammas above the normal values for the area. These anomalies are mapped and described. No conclusions were possible from the limited magnetic data so far obtained. - V. S.

7820. Zapffe, Carl. Memorandum Report on Iron Ores of the Cle Elum District, Washington. State of Washington, Division of Mines and Mining, Report of Investigations 5, Olympia, 1944, 27 pp.

The exposed iron ore of the Cle Elum district, Washington, was studied in a limited area with a view to determining the best portions of the deposit. The investigation included a magnetic survey. (1) At first, dip-needle readings were taken across known ore formations. The results agreed with the author's past experience for similar strike and dip. The maximum reading occurred at the middle, or a little to the east of the middle, of the ore formation. Where the strike was about N. 30° E., the readings to the west (on the sandstone) of the maximum attraction were positive, whereas those to the east (on the peridotite) were negative. Where the strike was N.S. and the dip westward, the readings both to the east and west showed a drop to negative values and produced a profile almost symmetrical about the point of maximum attraction. (2) After this preparatory work, dip-needle readings were made across a nearby unknown area. The profiles showed a magnetic belt containing maxima of moderate intensity. The plotting gave gently sloping curves. In the light of previous observations, the entire configuration suggested the presence of a continuous band of ore formation. - V. S.

3. SEISMIC METHODS

7821. American Society of Civil Engineers. Seismological Definitions and Nomenclature. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 4, 1944, pp. 217-228.

The American Society of Civil Engineers authorized in 1940 a Committee on Seismology. This committee in turn set up a Subcommittee on Definitions and Nomenclature for standardizing terminology in publications. The subcommittee now publishes a preliminary report for critical examination by seismologists and others interested in earthquake phenomena. The report offers a list of symbols and a set of definitions for terms pertaining to mechanics, elasticity, elastic waves, earthquakes, instruments recording earthquakes, and engineering. Suggestions on desirable changes are welcomed. - V. S.

7822. Bruckshaw, J. McG. Geophysical Prospecting and Engineering Problems. In the book: Blyth, F. G. H., A Geology for Engineers, London, Edward Arnold & Co., 1943, pp. 277-289.

The engineering problems, to which geophysical methods have been applied with success, usually are either problems of foundations for dams, bridges, highways, etc., or else problems of water supply. Of the various methods, two have been found most suitable for this work - the seismic method and the resistivity method. Originally, the resistivity method was employed almost exclusively. Since 1938 the seismic method was also adopted and is now regarded as standard. The two methods are briefly described with respect to underlying principles, field techniques, and apparatus; examples are given. A bibliography is appended. - V. S.

7823. Carreño, Alfonso de la. El volcan de Paricutin en las primeras fases de su erupcion. Consideraciones de caracter geofisico sobre el volcanismo (The Volcano Paricutin in the First Phases of Its Eruption. Geophysical considerations Regarding Volcanism). Irrigacion en Mexico, Mexico, vol. 24, No. 4, 1943, pp. 49-80.

Volcanism and associated earthquakes; treats of geology and chemistry especially but with mention of earthquake activity. Discusses the contribution to problems, possible through more adequate geophysical observations, including gravity and seismic. - N. H. Heck, Bibliography of Seismology, Dominion Observatory, Ottawa, No. 15, 1944, 255.

7824. Dana, S. W. The Partition of Energy Among Seismic Waves Reflected and Refracted at the Earth's Core. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 4, 1944, pp. 189-197.

The author calculates, for various angles of incidence, the ratios of energies of the waves reflected and refracted at the surface of the earth's core. He assumes that, as the core is approached, the material of the earth changes abruptly from an elastic solid to an elastic, greatly compressed liquid; the density of the core is regarded to be almost twice that of the surrounding mantle. In the calculations, Zoeppritz's equations are used, describing the general case of six boundary conditions in terms of the amplitudes and angles of reflection and refraction produced at the discontinuity between two media with different elastic properties. These general equations are applied to four cases of incidence of P and S in the mantle against the core. The mathematical discussion is presented. - V. S.

7825. Eby, J. B. Seismic and Resistivity Geophysical Exploration Methods. U. S. Waterways Experiment Station, Vicksburg, Miss., Tech. Memo. 198-1, 1943, 90 pp.

A complete report of field tests of the seismic refraction method and the resistivity method in expediting and reducing the cost of boring methods of subsurface exploration in connection with Levees in the Mississippi Valley. Tests were made at three sites. Seismic refraction profiles were run and resistivity depth curve data obtained which in many cases because of location could be correlated with nearby existing bore holes. It was found that the velocity of seismic wave travel in the underlying Tertiary material (the depth to which was sought) was equal to or less than that of overlying saturated alluvial beds. This condition rendered the seismic data uninterpretable.

Resistivity results showed that depth to the Tertiary could be determined with an average error of 11 percent compared to bore hole depths. This was checked at 15 points. Depths averaged from 150 to 175 feet. Resistivity work was considered adequate for engineering problems of determining the location of levees; combatting levee under seepage, and the location of revetments, as well as planning channel improvements where depth and general composition of alluvium are important factors.

The report gives detailed maps of the sites of the separate studies and a discussion of the findings and interpretation of geophysical results. Also included is a section describing the principles of the seismic refraction method and the resistivity method. Pictures of equipment are presented. The seismic apparatus was of special design for outdoor daylight use and portable by hand. - D. W., Mines Mag., vol. 34, No. 10, 1944, p. 565.

7826. Gutenberg, Beno. Reflected and Minor Phases in Records of Near-by Earthquakes in Southern California. Bull. Seism. Soc. Am., Berkeley, Calif., vol. 34, No. 3, 1944, pp. 137-159.

This paper is a continuation of an investigation of 50 earthquakes in southern California (Geophys. Abs. 119, No. 7680). The former study of observed travel times is here combined with a new study of the corresponding amplitudes. As a result, an interpretation of seismograms becomes possible. It consists in postulating above the Mohorovicic discontinuity a certain structure comprising a "granitic layer" and two intermediate layers; the granitic layer may be frequently situated below sediments. The three layers are discussed with respect to their depths, thickness, wave velocities, observed and calculated travel times, amplitudes, physical constants, etc. The entire structure is found well to explain the travel times and amplitudes of the recorded waves. - V. S.

7827. Gutenberg, B., and Richter, C. F. Frequency of Earthquakes in California. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 4, 1944, pp. 185-188.

The historical record of earthquake frequency in California was verified by means of a statistical comparison with the earthquake frequency in the world as a whole. For this purpose, shocks were classified according to the instrumental magnitude scale. For the study of smaller shocks an area was delimited, including most of southern California, a small part of adjacent Mexico, and the Owens Valley. The figures of frequency are presented and discussed. It is found that the California-Nevada region has about 90 percent of the seismic activity in the entire United States. - V. S.

7828. Gutenberg, B., and Ricter, C. F. Recent Results of Earthquake Study in Southern California. Trans. Nat. Research Council, Am. Geophys. Union, 1943, pt. I, Washington, D. C. 1943, pp. 95-96.

This report summarizes the results of several studies of earthquakes in southern California. The studies have been partly published and partly are in preparation. The first synthetic investigation of earthquakes in southern California appeared in 1932 and dealt with wave velocities and travel times at small distances. The subsequent studies cover 50 of the larger and better recorded shocks, all but 5 later than 1937. They make use of data much improved by the installation of Benioff seismometers with high magnification at most stations. They also benefit by the additional experience gained in interpretation. - V. S.

7829. Hayes, R. C. Earthquakes in New Zealand During the Year 1943. New Zealand Journal of Science and Technology, Wellington, N. Z., B. General Section, vol. 25, No. 5, 1944, pp. 226-228.

The epicenters of principal earthquakes in New Zealand during 1943 are presented on a map. An accompanying list gives the dates, times, and maximal felt intensities of these earthquakes. The most notable feature of the year 1943 was the unusual amount of activity in the South Island, especially in the southwestern portion. There was also a marked concentration of activity in the Wairarapa region, most of the shocks being of slight intensity. - V. S.

7830. Heck, N. H. Japanese Earthquakes. Bull. Seism. Soc. America, Berkele Calif., vol. 34, No. 3, 1944, pp. 117-136.

The 61 principal Japanese earthquakes from 1596 to the present time are briefly discussed in regard to geographic distribution, destructive effects, and lessons from observations. The Formosa earthquakes are also listed and briefly characterised. - V. S.

7831. Hodgson, E. A. Recent Developments in Rockburst Research at Lake Shore Mines. Trans. Dom. Observ., Ottawa, vol. 46, 1943, pp. 313-324.

The development of high pressure in mine rocks is indicated by means of geophones which detect piezo-electrically the "subaudible snaps" which accompany slight yielding. The currents produced in the geophones are amplifie to operate pen recorders. Suitably placed geophones can indicate high-pressure zones and detect their shift from one point to another and their development to danger point. - A. Hu, Sci. Abs., London, vol. 47, No. 554, 1944.

7832. Homma, S. On Rayleigh and Stoneley Waves (in Japanese, with an Englis summary). Jour. Meteorol. Soc. Jap., Tokyo, vol. 17, 1939, pp. 43, 442-450.

In this paper are obtained the general expressions of Rayleigh waves when there are two layers over a semi-infinite solid. A developed form of the characteristic equation is obtained. The expressions for Stoneley waves are obtained as special cases of the expressions for Rayleigh waves. By a simple numerical calculation it is shown that for Stoneley waves, when there is a layer of thickness H between two semi-infinite solids and the magnitudes of its elastic constants lie between those of the two semi-infinite solids, there are two dispersion curves, normal and abnormal. The velocity of Stoneley waves for $H = 0$ corresponds to the asymptotic value of the abnormal curve for $L/H \rightarrow \infty$, where L is the wave length. - Y. Kodaira, Zentralbl. Geophys. Meteorol. Geodäs., vol. 6, 1940-41, p. 20.

7833. Jones, A. E. Earthquake Magnitudes, Efficiency of Stations, and Perceptibility of Local Earthquakes in the Lake Mead Area. Bull. Seism. Soc. America, Berkeley, Calif., vol. 34, No. 3, 1944, pp. 161-173.

A statistical study was made of seismographic registration in the Lake Mead area. The magnitudes of more than 1,000 local earthquakes were collected into frequency tables and polygons for the years 1941-42. This material led to several conclusions: (1) The efficiency (locating power) of the entire system increased with smaller distances between stations and better coverage attained by adding one more station. (2) The mode or the magnitude of the most frequently located shocks dropped from magnitude 3.0 in early 1941 to magnitude 2.5 when distances between stations and probable epicenters were reduced by the additional station. (3) More than half the total local energy released annually was expended in the largest shock or group of shocks. (4) The energy released by local earthquakes in 1942 approximately equalled that released in 1941. (5) Finally, the magnitude and perceptibility range of small shocks appeared to be a linear function of local distances; equations of this relationship are given. - V. S.

7834. Kanai, Kiyoshi. Model Experiments for Confirming the Dissipation Phenomena (Scattering) in the Seismic Vibration of a Structure. Bull. Earthquake Res. Inst. Tokyo, vol. 17, 1939, pp. 37-48.

Model experiments were made for ascertaining the dissipation of energy of vibration of a structure into the ground. A gelatin cylinder with the upper end free and the lower end clamped was placed on a shaking table, and the inclination of the upper end was optically recorded on a sheet of bromide paper on the same table; then the cylinder was fitted into a cylindrical hole of a square gelatin block, and the vibration of the upper end was also recorded. In two such experiments it was ascertained that the maximum of the resonance curve in the latter case is smaller than that in the former case. The problem was solved mathematically when there is no viscous damping, and it was found that there is the same tendency between the two resonance curves, but since in the experiments the viscous damping is large, the mathematical solution gives only a qualitative result. The problem is very difficult when there is viscous damping and it was shown from a simple calculation that the two kinds of damping act in the same sense. - Y. Kodaira, Zeutrabl. Geophys. Meteorol. Geodäs., vol. 5, 1940, p. 78.

7835. Kirillov, F. A. The Influence of the Depth of Blasting on Seismic Effects (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 74-77.

The depth of a blasting charge affects the magnitude of the seismic effect. The character of this dependence was studied during blasting at Magnitogorsk. The observations were conducted by means of the three-component electrodynamic vibrographs of Shnirman. Their sensitivity is 6 to 1 mm./sec., and their period varies from 0.5 to 0.9 sec.. The testing ground consisted of diluvial clay and kaolinized rock. Two experiments were made. In the first, 13-kg. ammonite charges were used at distances of 14 and 22 meters from the instruments, at depths ranging from 3.2 to 18.0 meters. In the second experiment, 1.0-kg. charges were used at distances of 6 and 10 meters, at depths of 0.8 to 7.0 meters. The results for the main vibration phase and for the first vibration maxima are tabulated. Curves show the relationship between the depth of the charge and the change in the velocity of ground vibration. A formula is given for the computation of velocity at a certain point, and its applications are discussed. - V. S.

7836. Macdonald, G. A. The 1942 Eruption of Mauna Loa, Hawaii. Annual Report of the Board of Regents of the Smithsonian Institution, 1943; Washington, D. C., 1944, pp. 199-212.

The author gives an account of the 1942 eruption of Mauna Loa. He points to the seismic predication by R. H. Finch, presents the facts of early summit activity and flank eruption, and describes the lava flow and the bombing of the lava. In conclusion, three phases are distinguished in the flank eruption: (1) Initial extrusion, (2) restriction of the fountains, and (3) decline of the flow. - V. S.

7837. Oil and Gas Journal. Start Exploration Work on Union-Oil Company's Paraguay Concession. Tulsa, Okla., vol. 43, No. 34, 1944, p. 163.

The Union Oil Co. of California has started exploration on its concession in the Chaco territory, Paraguay. The Western Geophysical Co. is now conducting a seismic survey to outline areas favorable for drilling. No oil wells have been ever drilled in Chaco, and no rock outcrops were found there. Therefore, the seismological data will furnish the only guidance for mapping structures and judging the thickness of sediment. - V. S

7838. Petrenko, E. E. A Net of Coordinates for Determining the Epicenter an Earthquake (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 12-16.

In seismic observation it is important to locate the geographic positio of the epicenter immediately after an earthquake has been recorded. The author mentions existing methods and points to their slowness. He offers a new method which is quick and sufficiently precise. Use is made of a net of coordinates with a center of projection chosen to correspond to the geographical azimuthal coordinates of a basic seismic station (such as the station of the Seismological Institute in Moscow). The net is drawn on the basis of formulas deduced from a spherical triangle PZK. In this triangle, P is the pole, Z the center of projection (such as station Moscow), K the sliding point with the coordinates φ and λ, r the distance from this sliding point to the center of projection, and α the azimuth of the sliding point with reference to the meridian of Z. The formulas for solving the triangle are given. The determination of the data was made by means of a method recommended by A. A. Mikhailov. The computations are described. - V. A.

7839. Petroleum Engineer. English Oil Field. P. E., Dallas, Tex., vol. 16, No. 2, 1944, p. 254.

An official disclosure was recently made that oil has been discovered in England during the war and is being extensively developed. The location of the oil fields is secret. The total production in the war period has reached 78,000,000 gallons. The seismic method of survey was employed and has proved to be of great value. - V. S.

7840. Ricker, Norman. Wavelet Functions and Their Polynomials. Geophysics, Menasha, Wis., vol. 9, No. 3, 1944, pp. 314-323.

This paper is a further extension of the author's wavelet theory of seismogram structure. The wavelet functions used in the previous paper are extended, a modified notation is adopted, and twenty four of the polynomials are given, together with their roots. Expressions are given for the displacement, velocity, and acceleration type wavelets. - Author's abs.

7841. Robles Ramos, Ramiro. El volcan de Paricutin y el neo-volcanismo Mexicano (The Volcano Paricutin and Mexican Neo-Volcanism). Irrigacion en Mexico, Mexico, vol. 24, No. 4, 1943, pp. 81-122.

Volcanism and associated earthquakes. Chiefly from viewpoint of volcanology. The mechanical and chemical aspects. Demonstrates that strong seismic activity is purely local. - N. H. Heck, Bibliography of Seismology, Dominion Observatory, Ottawa, No. 15, 1944, p. 264.

7842. Sadovskii, M. A. Determination of Seismic Danger-Zones in Blasting (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 64-73.

Heavy blasting unquestionably affects buildings, but the effects attributed by laymen are usually exaggerated. The author analyses the mechanism of the destructive action of blasts. The closer the vibration period of a building approximates the vibration period of the ground, the greater the destructive effect on the building. Therefore, these periods must be studied together. (1) The periods for typical classes of buildings have been determined by engineering research. They range from 0.3 to 1.0 seconds; the paper cites some values. (2) The periods for the blasting are expressed in formulas for different types of ground, in terms of distance up to 2,000 meters. Destructive effects at greater distances can be ignored. For practical purposes the periods for different ground would range from 0.01 to 0.30 seconds. (3) Previous studies at the Moscow Seismological Institute have shown that buildings on alluvial ground are destroyed only at velocities of propagation equal to, or exceeding, 12 to 14 cm./sec.; the formulas for velocity and amplitude are discussed. (4) The deformation of buildings is expressed by a formula given in terms of the velocity of ground vibrations, the ratio of the period of the building to the period of the ground, the extinction of the building's vibrations, and certain coefficients; several simplifying assumptions are made. This formula makes it possible to plot the curves of dependence of deformation on the distance and the force of blasting. (5) Finally, these curves serve for determining the radius of seismically dangerous zones; the values are tabulated. Various aspects of the problem are discussed. - V. S.

7843. Sawdon, W. A. The Oil Industry in Mexico. Petrol. Eng., Dallas, Tex., vol. 16, No. 1, 1944, p. 158.

Some geophysical prospecting is now in progress in Mexico. The seismic method is principally employed. The territory favorable for exploration includes the eastern part of the country stretching southward from the Texas border, along the Rio Grande and the coast of the Gulf of Mexico. It also covers the area extending some distance from the coast line and takes in the Yucatan Peninsula. There are, furthermore, possibilities in the southern part of Lower California. The greatest interest seems to center in the Tampico and Isthmus of Tehuantepec areas where production has been obtained. - V. S.

7844. Seismograph Service Corporation of Delaware. (1) Gulf, Mexican, and Caribbean Oil Zones. (2) South American Oil Zones. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 34, 1944, pp. 182-199.

The Seismograph Service Corporation of Delaware has prepared nine geological maps of oil zones in Central and South America. The maps show in different colors the depositional areas of major sedimentary geological systems, the locations of oil fields, and oil possibilities. They are presented in the following order: (1) Gulf, Mexican, and Caribbean Oil Zones: Jurassic, Cretaceous, Eocene-Oligocene, and Miocene-Pliocene; and (2) South American Oil Zones: Devonian, Permo-Carboniferous, Mesozoic, Eocene-Oligocene, and Miocene-Pliocene. Geological discussions accompany the maps. They deal with the deposition of each system as related to oil accumulation, region by region; some areas favorable for exploration are indicated. - V. S.

7845. Ulrich, F. P. Progress Report of Seismological Work by the United States Coast and Geodetic Survey in the Western United States During 1943. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 34, No. 4, 1944, pp. 207-216.

The report gives an account of the work on the questionnaire program, strong motion, the tiltmeter, vibration, and instruments. A list of important earthquakes during 1943 is presented, with maps. Berkeley tiltgrams are illustrated by samples. The work of the Washington office is outlined. Earthquake activity during 1943 was again below normal for the second consecutive year. - V. S.

Weiss, Oscar. Report on the Geophysical Survey at Inhaminga. Incorporated in: Putnam, L. G., and Weiss, Oscar, Geological and Geophysical Report on the Inhaminga Structure Near Inhaminga, Portuguese East Africa, May 1935 (see abs. 7800 in this issue.)

7846. Zapol'skii, K. K. Results of the Investigation of Seismographs for the Registration of Reflected Waves (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 57-59.

The Shnirman seismograph (Geophys. Abs. 119, No. 7694) has been tested in the field. As a result, several improvements were introduced by the author: (1) An increase in the seismograph's period from 0.010 to 0.020-0.030 seconds by means of additional springs; (2) control of the period within 10 to 15 percent; (3) increase of the sensitivity of the instrument by 5 to 7 times, at the work frequencies 40-60 Hertz; (4) elimination of the adhesion of the magnet to the cores; and (5) improvement of the damping-piston device, attained by using water instead of heavy oil and by eliminating the effect of temperature. These improvements are described and discussed. - V. S.

4. ELECTRICAL METHODS

7847. Anderson, D. M. New Cable Design Increases Scope of Electrolog Operations. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 10, No. 4, 1944, p. 15.

To facilitate deep electrical logging, the Lane-Wells electrolog has been equipped with an armored cable. This cable is a six-conductor type with reverse concentric armor. Such an armor reduces to a minimum the cable's elongation due to torque. The structure of the cable is described, and the effects of mud buoyancy on the cable's weight are discussed. - V. S.

Bruckshaw, J. McG. Geophysical Prospecting and Engineering Problems. In the book: Blyth, F. G. H., A Geology for Engineers, London, Edward Arnold & Co., 1943, pp. 277-289. (See abs. 7822 in this issue.)

7848. Dienert, Frédéric. Méthode différentielle de prospection électrique du sous-sol (Differential Method of Electrical Prospecting of the Subsoil). Compt. rend. Acad. Sci., Paris, vol. 213, 1942, pp. 625-627.

Two tentative schemes are described for measuring variations in the electrical resistance of the subsurface. Both use a bridge connection and can operate on D. C. or A. C. The electrodes are made of carbon. One of the schemes employs three cables and works in the horizontal plane; the other uses four cables and operates in the vertical direction. The principles underlying the arrangements of the electrodes are discussed. - V. S.

Eby, J. B. Seismic and Resistivity Geophysical Exploration Methods. U. S. Waterways Experiment Station, Vicksburg, Miss., Tech. Mem. 198-1, 1943, 90 pp. (See abs. 7825 of this issue.)

7849. Fisch, W. Die geophysikalische Untersuchung von Kohlenvorkommen in der Schweiz (Geophysical Investigation of Coal Occurrence in Switzerland). Techn. Rdsch., vol. 34, No. 34, 1942, p. 17.

Electrical resistivity methods of prospecting are briefly outlined. As a practical example, the survey of a coal deposit in Switzerland is described. The deposit was a thin layer embedded in an irregular succession of Tertiary sandstone and marl. Resistivity measurements were made along two profiles at equal depths, on a slope 80 miles long covered with grass. In the diagram of results, separate subsurface layers showed up clearly, and correlation was possible. The coal layer itself was not distinctive, but it could be traced through indirect data. - V. S.

7850. Fritsch, Volker. Alcune indagini radiogeologiche eseguite nel 1939 (Some Radio-Geological Investigations Carried out in the Year 1939). Geof. pura appl., Messina, vol. 2, 1940, pp. 121-141.

The papers of the author on radio-prospecting made in 1939 are summarized. This work included surveys for ground water, for ore deposits, and for potassium deposits, as well as hydro-electric measurements. The summary also covers reports on the construction of a new apparatus for the application of high frequency to electrical prospecting. - V. S.

7851. Fritsch, Volker. Funkmutung (Radioprospecting). Ztschr. Ver. deut. Ingenieure, Berlin, vol. 87, 1943, pp. 136-137.

A brief summary is presented of electrical exploration by radioprospecting methods using high-frequency currents. Consideration is devoted principally to the method of "substitute capacity"; the sensitivity of instruments is here very high. The radioprospecting methods have been much in demand in recent years. They are particularly suited for the surveying of tectonic irregularities and ground-water masses, as well as for the detection of water in the desert. The interpretation of the data requires much experience. - V. S.

7852. Gabriel, V. G. Electrical Resistivity Methods of Exploration. Petrol. World, Los Angeles, Calif., Annual Review, 1944, pp. 90-93.

Much information has been gathered in recent years on the electrical resistivity of different constituents of the earth's crust. This information is utilized by electrical resistivity methods for detecting various deposits, or the structural and lithological conditions commonly associated with them. The methods employ direct or alternating currents of low frequency, electrodes to introduce the current into the earth, and electrodes with various devices for measuring the current and the potential. A number of field techniques have been devised. The author points to the Wenner and Gish-Rooney procedure, Lee's partitioning method, Jakosky's continuous profiling, etc. He briefly discusses Ohm's law, the multilayer problem, difficulties of oil detection, the correlation method, questions of interpretation, and the cost of surveying. A table shows the use of various resistivity methods in the United States from 1893 to 1944. - V. S.

7853. Grosskopf, J.. Das Strahlungsfeld eines vertikalen Dipolsenders über geschichtetem Boden (The Radiation Field of a Vertical Dipole Over Stratified Ground). Hochfrequenztechn., Leipzig, vol. 60, 1942, pp. 136-141.

Sommerfeld has given a mathematical function for the propagation of the radiation of a vertical dipole in a homogeneous ground. The author uses this function to calculate the propagation of radiation in a stratified ground; von Weyl has supplied the method. The calculation shows that Sommerfeld's function can be applied to a stratified ground if the complex dielectrical constant of the upper stratum is multiplied by a correction factor. This factor depends upon the thickness of layers, the frequency, and the ground constants of separate layers. - V. S.

7854. Marsch, B. Die elektrische Messtechnik in der geophysikalischen Bodenforschung (The Technique of Electrical Measurements in the Geophysical Exploration of the Ground). Elektr. im Bergbau, Munich, vol. 15, 1940, pp. 17-21.

Geophysical exploration of the subsurface is briefly explained. Then a description is given of the chief electrical prospecting methods. Wenner's four-point scheme is outlined; a distinction is made between application to sounding and to mapping. The method of natural potential is indicated. It is further pointed out that seismic methods also use electrical measurements in registering waves on the oscillographs. The principal seismic methods are described. A bibliography is appended. - V. S.

7855. Müller, Max. Die Messung der Frequenzabhängigkeit der elektrischen Leitfähigkeit und Dielektrizitätskonstante von Gesteinsproben (Measurement of the Frequency Dependence of Electrical Conductivity and Dielectrical Constant on Rock Samples). Ztschr. Geophys., Brauschweig, vol. 18, 1943, pp. 59-66.

Measurements were made of the dependence of electrical conductivity and dielectrical constants on rock samples. The investigation was carried out by means of resonance methods which are described. The results for sand samples have shown that when their dielective constant declines to one-fifth, their conductivity rises to the extent of 50 times within a range of 20 to 10,000 Hertz. - V. S.

7856. Muskat, Morris. The Interpretation of Earth-Resistivity Measurements. Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1761, 1944, 7 pp.

The method of R. W. Moore for determining subsurface interfacial depths by means of integrated curves of apparent resistivity (Geophys. Abs. 119, No. 7707) has been analyzed theoretically. It is found that the only unique tangents that can be drawn to such curves are the asymptotes at infinite electrode spacing and the tangents through the origin at vanishing electrode spacing. Explicit expressions have been derived for the relationship between the electrode spacing at the points of intersection of these tangents and the thickness of the surface strata as a function of the conductivity parameters for the two-layer and three-layer earths. It is found that in all cases the electrode spacing at the points of intersection will exceed 3/2 of the thickness of the surface layer, and may even become indefinitely large as the resistivity of the deepest layers increases as compared with that of the surface layer. These results do not agree with the empirical findings of Moore that the intersection of the tangent lines fall at an electrode spacing very approximately equal to the thickness of the surface layer. - Author's abs.

7857. Ramachandra Rao, M. B. Notes on the Underground Prospecting Work Carried Out for Testing the Geophysical Indication at Guddadarangavvanahalli, Chitalgrug District. Records Mysore Geol. Dept., vol. 41, 1942; Bangalore, 1943, pp. 54-57.

Electrical surveys were conducted near Guddadaragavvanahalli in Chitaldrug district, Mysore, during 1939-40 (Geophys. Abs. 114, No. 7059). Both the spontaneous polarization and equipotential methods were used. In 1940-42 the electrical findings were tested by excavation. A considerable lode of graphitic schist was found nearly 100 feet below surface. This lode corresponded almost exactly with the position marked out by the electrical surveys. In the surface outcrops no graphitic schists were seen anywhere. - V. S.

Thyer, R. F. Report on the Geophysical Surveys at the Wallaroo-Moonta Copper Field. South Australia Department of Mines, Mining Review, Adelaide, No. 77, 1942, pp. 41-48. (See abs. 7819 in this issue.)

7858. Tikhonov, A. N., and Turkisher, R. I. The Influence of an Intermediate Layer in Vertical Electrical Sounding (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Série Géographique et Géophysique, Moscow, No. 5, 1942, pp. 219-227.

A study is made of the electrical field of a point-source situated over a three-layer medium possessing the following horizontal distribution: (1) The upper layer is supposed to have a constant conductivity σ'_0 and a thickness "h"; (2) the lower layer is assumed to have a conductivity $\sigma' = 0$; and (3) the two layers are separated by a layer of thickness equal to h_2, the conductivity of which is decreasing linearly from σ'_0 to σ'. A formula for the apparent resistivity is derived, and a graphical representation of this resistivity is shown in a figure. - W. A.

7859. Wallace, W. E., Jr. Structure of South Louisiana Deep-Seated Domes. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 28, No. 9, 1944, pp. 1249-1312.

A set of 1,000 electrical logs was used to study the subsurface structure of Louisiana oil fields. A coastal belt about 75 miles wide was covered. Attention was devoted particularly to the deep-seated domes in which the salt had not been reached. The types commonly found in this group are described. The most frequent type consisted of domed sediments with normal faults creating a graben. Typically, all of the structures studied contained normal faults. Such faults could be broadly divided into major and minor. These varieties are outlined. The distribution of oil and gas in the region is discussed. The log data are illustrated by numerous examples of cross sections at the various oil fields. - V. S.

7860. Wichmann, H. Predischarge Fields and Duration of Field Changes Due to Lightning. Gerlands Beitr. Geophys., Leipzig, vol. 59, No. 1, 1942, pp. 42-48.

From measurements of field changes due to lightning discharges by means of an earth plate, an aerial and a point-discharge recorder, comparatively slow field changes are found to precede some lightning discharges, particularly between clouds. The total duration of field changes is investigated and the results are subdivided according to storms with a predominance of cloud-to-cloud and cloud-to-earth flashes respectively, and to the earlier and later phases of a thunderstorm. - R. H. G., Sci. Abs., vol. 47, No. 560, 1944.

7861. Wichmann, H. Field Changes of Lightning Discharges Between Clouds and to Earth. Gerlands Beitr. Geophys., Leipzig, vol. 59, No. 3/4, 1943, pp. 299-305.

Further registrations with the methods described (see above) confirm the different types of field changes caused by cloud-to-cloud and cloud-to-earth strokes. The predominance of the two types of discharges in various storms and a possible history of an average storm are discusses. - R. H. G., Sci. Abs., vol. 47, No. 560, 1944.

5. RADIOACTIVE METHODS

7862. Beers, R. F. Radioactivity and Organic Content of Some Paleozoic Shales. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 1, 1945, pp. 1-22.

By measurement of the total beta activity, the total alpha activity, and the radium content, a new method has been developed for the routine determination of radioactive substances in sedimentary rocks. The important radioactive elements in these rocks are uranium, thorium, and potassium. Earlier work by Beers and Goodman has shown that these radioactive elements may be found largely in three principal loci: (1) In association with the heavy minerals of sands and sandstones; (2) in K^{40}, the active isotope of potassium which is found in evaporites, oil-field brines, clastic fragments of micas and other potassium-bearing minerals, and in clays and shales which may contain up to 6.5 percent potassium; (3) in the uranium and thorium content of shales and clays, impure limestones and marls, shaly sandstones, and organic sediments. Pure limestones and pure quartz sands are found to exhibit practically no measurable radioactivity. Black shales containing up to 16 percent organic matter have been found to contain high concentrations of the three principal radioactive elements. Excellent correlations are shown to exist between uranium content, the thorium-uranium ratio and carbon content in individual shale formations. These studies throw new light on three important problems: (1) The sedimentation environment of Paleozoic black shales, (2) the evolution of petroleum source beds, (3) the relationship of radioactive and organic matter in these beds. - Author's abs.

7863. Gerling, E. K. Age of the Earth According to Radioactivity Data. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 34, No. 9, 1942, pp. 259-261.

Previous estimations of the age of the earth from the content of radioactive elements in its crust are briefly reviewed. A new computation is given, based on the isotropic composition of leads of different age and origin. The age of the earth is established as $\nless 3 \times 10^9$ to 4×10^9 years. - A. E. T., Sci. Abs., vol. 47, No. 560, 1944.

7864. Morgan, Joseph, and Bohn, J. L. Experiments on the Theory of the Action of the Geiger Point Counter. Jour. Franklin Inst., Lancaster, Pa., vol. 237, No. 5, 1944, pp. 371-384.

Curves are included showing the relationship between voltage and relative position of electrodes, and between voltage and counter gas pressure. Also included are experiments on the preparation of sensitive and insensitive points, and experiments with different electrode materials. These data are for a counter operated with the point at negative potential. Zeleny's conclusion that a high resistance layer of adsorbed gas exists at the point is adopted. In addition, the assumption is made that the field at the point at the onset of "self-counting" is sufficient to produce auto-electronic emission. This combination now leads to a theory which accounts for the various characteristics of the counter and explains the threshold of counting curve, the auto-counting curve, and the continuous discharge curve. Probability considerations account for the selective counting of different ionizing agents in certain voltage ranges, for the dependence of counting upon path of ionizing through the chamber, and for the increase of counts with increase of voltage from threshold of counting to the point where all rays are registered. - Authors' abs.

7865. Rajewsky, B. Das Geiger-Müller Zahlrohr im Dienste des Bergbaues (The Geiger-Müller Counter in the Service of Mining). Ztschr. Physik, Berlin, vol. 120, 1943, pp. 627-638.

Deposits with radioactive admixtures, such as radium ores, potassium outcrops, oil accumulations, etc., can be detected by means of measurements of gamma-ray intensity. The Geiger-Müller counter usually serves for this purpose. As regards detecting instruments, there arises the problem of a sensitivity either receptive in all directions and exploring a symmetrical sphere, or receptive along a single line and exploring a definite direction. Both characteristics are essential in exploration. The author discusses these and related requirements. Information is further furnished on new instruments specially adapted for boreholes. - V. S.

7866. Rona, Elizabeth. Radioactivity of the Ocean (Abs.)Jour. Washington Acad. Sciences, Menasha, Wis., vol. 34, No. 5, 1944, p. 162.

It has been shown that the ocean sediments, especially those lying below very deep water and far from the continent, have radium content 4 to 10 times greater than that of rocks, even of granite. In order to learn whether the origin of this high radium content can be explained by a chemical or biological precipitation from sea water, samples from different locations and different depths were investigated by H. Pettersson and the author, and C. S. Piggott and W. D. Urry and the author. In both sets of samples the amount of radium was found to be very low, in disagreement with the results found by former scientists, but in good agreement with R. D. Evans and collaborators. The uranium content in the waters around the west coast of Sweden and in the northern Atlantic was found higher, as is necessary to uphold the equilibrium for radium found in the same samples, whereas in the sea-bottom sediments the relation of radium to uranium was just the opposite. No possible explanation can be offered yet, until further investigations have been made. - Author.

7867. Sen Chowdhury, P. K. Radium Content of Ceylon Thorianite. Indian Jour. Physics, Calcutta, vol. 17, No. 5, 1943, pp. 257-261.

A pliotron-amplifier has been set up for the study of many interesting nuclear and radio-active phenomena. With this amplifier and ionization chamber, the radium content of a sample of Ceylon thorianite has been estimated by the well-known gamma-ray method of estimation. The amount of radium present approximately amounts to 5.94×10^{-8} gm. per gm. of the mineral. - Author's abs.

7868. Simpson, J. A., Jr. Reduction of the Natural Insensitive Time in G-M Counters. Phys. Rev., Lancaster, Pa., vol. 66, Nos. 3-4, 1944, pp. 39-47.

The limitation on the Geiger-Müller counter insensitive time which is imposed by the presence of the positive ion space charge has been reduced by collecting the positive ions on the counter center wire instead of at the outer cylinder. The electronic circuit which carries out this process is described in detail. A reduction by another order of magnitude in the insensitive time or an insensitive time of about 2×10^{-5} sec. is obtained with no indication that the limit of the new method has been reached. The general properties of an inverse counter are discussed. The mechanism of this mode of counter operation is explained with considerable evidence indicating the presence of three distinct ion-collection regions for the negative center wire. A stable circuit useful as a research tool has been devised for use with a large variety of counters. - Author's abs.

7869. Starik, I. E. Earth's Age by Radioactive Data (Abs.). Internat. Geol. Cong., 17th Sess., U.S.S.R., 1937; Abs. of Papers, Moscow, 1937, p. 192.

Radioactive methods serve to measure both the geological age and the astrophysical age of the earth. The geological age can be determined: (1) By the lead technique (maximum age 1,600 million years), (2) by the helium technique (maximum age 900 million years), and (3) by the aureole technique (maximum age 800 million years). The astrophysical age of the earth can be determined: (1) By the lead technique using the interrelations between the average quantities of Pb, U, and Th in the earth's crust, or else the relationship AcD:RaG in ordinary lead; and (2) by the helium technique based on the results of meteorite analysis. The most probable astrophysical age of the earth so determined approximates the results obtained by other methods. - V. S.

7870. Terrestrial Magnetism and Atmospheric Electricity. Note: Geiger Tube. Baltimore, Md., vol. 49, No. 4, 1944, p. 266.

Workers in radiation now have commercially available a practical, well-constructed Geiger Tube manufactured by the Cyclotron Specialties Company, Moraga, California. This new Geiger-counter tube, 3.5 inches in diameter by 5 inches long, has a mica window, only 0.0006 inch thick with an effective area of 15 square centimeters. It has an exceptionally level, broad plateau of 250 volts, with a background of only one or two counts per second when shielded with 2 inches of lead. The sensitivity to beta-rays is high, and the over-all efficiency is at least 40 percent.

7871. Zwerger, R. von. Erdölgeologische and -technische Auswertungsmöglichkeiten von radioaktiven Bohrlochuntersuchungen (The Evaluation of Geological and Technical Possibilities of Oil Finding by the Radioactive Investigation of Boreholes). Oel u. Kohle, Berlin, vol. 39, No. 12, 1943, pp. 333-352.

The author describes the radioactive investigation of boreholes and discusses its application to oil finding. The underlying facts of physical sciences are indicated. An outline is given of the development of gamma-ray measurements and techniques, the accuracy and speed of measurements, and the sensitiveness of apparatus. The data obtained by measurements are described and illustrated by samples of logs and drawings. Consideration is further devoted to questions of the gamma radiation of clays, uranium accumulation in clay sediments, negative readings for oil sands and lime, discrepancies in measurements, laboratory and surface checks, and geological interpretation. Finally, the uses and possibilities of radioactive methods in oil exploration are critically examined. Numerous references to American and Russian literature are made throughout the text. - V. S.

6. GEOTHERMAL METHODS

7872. Courtener, A., and Chudnovskii, A. A Probing Instrument for the Investigation of Heat Conductivity in the Ground (in Russian). Zurnal Tekhnicheskoi Fiziki, Leningrad, vol. 9, 1939, pp. 1430-1432.

In geothermal investigations of heat conductivity, special cylinders of heat-conducting material have been used with thermometers. A new instrument is now offered, combining in a single unit a heat-conducting body and a thermo-element. The conducting body has the dimensions 70 x 70 x 6 mm. The advantages of this apparatus in comparison with the cylinder are indicated. - V. S.

7873. Kraskovsky, S. A. The Apparatus for Geothermal Measurements in Boreholes (in Russian). Akademiia Nauk S.S.S.R., Trudy Komissii po Geotermike, Moscow, Vypusk I, 1941, pp. 45-49.

The first geothermal measurements in Russia were made in the seventies of the 19th century; the same primitive instruments were used as in Europe at that time. Continuous improvements were effected in later surveys. In 1893 Iachevskii employed a mercury thermometer with the bulb wrapped in cotton and sealed with paraffin; it was lowered into a borehole in an iron cylinder. Later Iachevskii introduced a hermetic steel cartridge. Gradually this cartridge was equipped with outside springs for preventing swinging, a double screw lid, a rubber bumper bottom, and an inside support with holders for several thermometers. As a result, the instrument gained in weight, so that much time was required for measurement. Therefore, other principles of measurement were tried. Kuznetsov designed a thermograph similar to meteorological models, but it proved to be inaccurate. Kuznetsov and Altberg constructed an electrical resistance thermometer which was likewise unsatisfactory. Finally, in 1931 the Geothermal Division of the Geophysical Institute perfected the mercury thermometer. Devices were provided for a speedy lowering of the cartridge and for a measurement of depth. Inside the cartridge is now placed a brass container with three thermometers. Broad slits in the outer walls facilitate readings of the temperature. - V. S.

7. GEOCHEMICAL METHODS

7874. Kriegel, M. W. Analysis for Hydrocarbons in the Presence of Nitrous Oxide. Geophysics, Menasha, Wis., vol. 9, No. 4, 1944, pp. 447-462.

The technique for the analysis of soil air for small quantities of hydrocarbons is reviewed. Various methods of expressing results and the basis for the calculation of each are given. Field data on expansion ratios are presented to show that a gas, other than the saturated hydrocarbons, exists in the soil air, which is not removed by the screening agents and is retained in the condensation trap. The reasons for believing that this gas is nitrous oxide are given, together with plausible sources of this gas in the soil air. Laboratory data are presented on the analysis of pure hydrocarbons in the presence and in the absence of this gas. Calculations made by each of the methods show that when results are based on after-burning readings, a true measure of the hydrocarbon content is evolved, regardless of the presence of nitrous oxide. - Author's abs.

7875. Theodorovich, G. I. Sulfur in the Buguruslan Oil Region. Comptes Rendus (Doklady) de l'Academie des Sciences de l'U.R.S.S., Moscow, vol. 39, No. 3, 1943, pp. 118-120.

Previous observations in the Sterlitamak-Ishimbaevo oil region had led the author to conclude that when the roof of an oil deposit and its gas cap are disturbed, a sulfur-bearing zone is formed in the overlying formations (Geophys. Abs. 117, No. 7444). The present observations on the occurrence of sulfur in the Buguruslan oil region tend to support this conclusion. They fall into two groups: (1) In the southern wings of the Bolshe-Kinel'skii uplift, and in its continuation northwestward, natural sulfur occurs inside the water-oil zone, while the industrial oil deposits lay immediately to the north. (2) In the north-western direction and in the northern part of this uplift, the gas and water-bearing zones approach one another; here natural sulfur is scattered over a wide aureole, and the possibility of oil occurrence is limited. It is deduced from these observations that, in oil prospecting, the presence of natural sulfur in spiriferous deposits under an anhydrite cover points to the existence of peripheral zones of a gas-oil deposit in the formation below. - V. S.

7876. Williams, Neil. Mud-Analysis Logging. Petroleo Interamericano (printed in Spanish and English), Tulsa, Okla., vol. 2, No. 3, 1945, pp. 70-73.

The detection of oil during well drilling can be facilitated by mud analysis. The latest technical improvements in such analysis are described. They include special apparatus for the determination of the hydrocarbon content of the drilling fluid, depth meters, automatic drilling-rate meters, pump-cycle counters, mud-pressure recorders, torque indicators, weight-on-the-bit indicators, warning devices for possible blow-outs and trouble from intrusion of high-pressure salt-water flows, etc. A schematic lay-out of a movable laboratory installation is given, and a profile illustrates the mud-analysis log. - V. S.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

7877. Aerial, Geological, and Geophysical Survey of Northern Australia. Report for Period Ended 30th June, 1940. Parliament of Commonwealth of Australia, Govern. Printer, Canberra, 1940.

Reports are given on the Lawn Hill-Wollogorang district, the Hodgkinson district and the Cairns district in Queensland, and the Wauchope Creek district, Northern Territory. A geophysical survey was conducted in the Redbank copper field, Northern Territory. - R. O. Chalmers, Australian Sci. Abs., vol. 20, No. 6, 1942, p. 42.

7878. Bays, C. A., and Folk, S. H. Developments in the Application of Geophysics to Ground-Water Problems. Illinois State Geol. Survey Circ. 108, Urbana, 1944, 25 pp.

Geophysical exploration can locate ground-water supplies and is useful for drilling, completing, and producing water wells. The authors briefly summarize such work in the past and outline recent applications in Illinois. (1) In surface surveys, electrical resistivity, electrical potential, magnetic, seismic, gravitational, thermal, radioactive, and radio methods have been employed, with varying success. Most work was done by the electrical resistivity method. The Illinois Geological Survey used the Gish-Rooney electrical resistivity circuit in a modified form; the principle is described. (2) In subsurface surveys, electrical resistivity, electrical potential, thermal, and sonic methods have been applied for logging the wells. The Illinois Geological Survey employed most of these methods; the equipment is described. Electrical logs, temperature logs, and fluid-resistivity logs are discussed, and samples of curves are given. The conclusion is drawn that geophysical surveys of water supplies have proved their usefulness beyond doubt. A further development of geophysical techniques and instruments for ground water exploration is advocated. A discussion by N. A. Rose, P. A. Dickey, E. W. Bennison, O. F. Ritzmann, P. D. Krynine, W. V. Howard, C. D. Adams, and C. A. Bays follows. - V. S.

7879. Bruckshaw, J. McG. Geophysical Methods Applied to Oil Prospecting. Jour. Inst. Petrol., London, vol. 30, No. 250, 1944, pp. 271-312.

This paper is a part of a symposium on modern petroleum technology initiated by the Institute of Petroleum, London. It describes in popular language the principal geophysical methods applied in oil prospecting. The author covers the seismic, gravitational, electrical, and magnetic methods. He deals with underlying principles, applications, interpretation, results, advantages and limitations. Information relating to instruments and field techniques is omitted. The text is illustrated by drawings. A discussion accompanies the paper. - V. S.

7880. Bilbao la Vieja, G. V. Exploracion Geofisica (Geophysical Exploration). Mineria Boliviana, La Paz, vol. 1, No. 6, 1944, pp. 22-24.

The usefulness of geophysics in the exploration of Bolivian resources is discussed. The magnetic, gravimetric, electric, and seismic methods are briefly outlined. - V. S.

7881. Cooke, A. C. H. Lane-Wells Gun-Perforator Operations Below 15,000 Feet. Tomorrow's Tools - Today, Lane-Wells Co., Los Angeles 11, Calif., vol. 10, No. 3, 1944, pp. 16-17.

The oil well of the Phillips Petroleum Co. in Pecos County, Tex., is 15,270 feet deep. Gun-perforating operations were made in this well. They show the practical potentialities of existing instruments. The standard Lane-Wells truck and servicing equipment for casing perforation was used. The temperature at the depth of 15,250 feet was 242° F. The pressure of the mud at the bottom of the hole approximated 8,400 pounds per square inch. 112 holes were shot in 5 perforating runs. The total time required was 16.5 hours. - V. S.

7882. Gregersen, A. I. Exploratory Activity and Oil and Gas Discoveries in California - 1944. California Oil World, Las Angeles, Calif., vol. 37, No. 22, 1944, pp. 1-11.

The author gives statistics on oil exploration in California during the first 9 months of 1944. This period represents an all-time high in California exploratory drilling, but the average oil reserves per field discovered will probably reach the lowest point in California history. Exploration generally increased in efficiency. Of the total exploratory holes drilled in 1944, 23.2 percent were successful compared with 18.0 percent in 1943. However, two types of wildcats showed greater failures. The wildcats drilled on subsurface geology alone were 11.8 percent successful this year compared with 18.2 percent las year. Likewise, the wildcats drilled on seismograph work were 19.5 percent successful in 1944 compared with 27.0 percent in 1943. - V. S.

7883. Heiland, C. A. Geophysics. Min. and Met., New York, vol. 26, No. 458, 1945, pp. 99-104.

Geophysical exploration conducted in the Western Hemisphere in 1944 is reviewed from a technical and statistical standpoint. For the United States, the review covers oil exploration, well logging, mineral exploration, progress of field techniques, and the material and manpower situation. (1) Oil exploration in 1944 has been ahead of 1943 by nearly 30 percent. The monthly average of prospecting crews in the field was 451, while in 1943 it was 340. (a) All geophysical methods participated in the gain. In terms of total activity, seismic operations amounted to 67 percent; gravimeter operations, to 28 percent; and other methods, to 5 percent. As compared with the 1943 average, seismic work increased 18-1/2 percent; gravimeter work, 73 percent; and other methods, 92 percent. In comparison with the pre-war average of 1941, seismic operations increased 58 percent; gravimeter operations, 88 percent; and other methods, 283 percent. (b) The distribution of activities over different parts of the United States has reflected the increased interest in southeastern States following discoveries in Miss., Ala., and Fla. As a result, Tex., La., Miss., Ala., and Ark. claimed about 55 percent of total activity; Okla., Kan., Neb., and Mo. 14 percent; Wyo., Mont., Colo., and N. Mex. 14 percent; Fla., Ga., Va., and Carolina, 10 percent; Calif., 4 percent; and Mich., Ill., 3 percent. The principal discoveries in the various States are briefly described, and the success of different methods is indicated. (c) The average monthly financing of oil exploration in 1944 came to nearly 3 million dollars. This figure is computed on the assumption of an average cost of $8,000 for a seismic crew, $4,000 for a gravimeter crew, and $2,000 for other crews. (2) Well logging has kept in step with prospecting. (a) The number of electrical well-logging operations was about 12,000 for 1941, 9,000 for 1942, 11,000 for 1943, and is expected to reach about 15,600 for 1944. In terms of total wells completed, electrical well-logging operations numbered 37 percent in 1941, 43 percent in 1942, 57 percent in 1943, and about 64 percent in 1944. (b) With an average cost of $300 for an electrical logging operation, the total expense for oil prospecting and well logging was in 1944 slightly more than 40 million dollars, against $31,500,000 in 1943. This represents an increase of 28 percent. (3) Minerals Exploration has increased under the pressure of the war. The Bureau of Mines investigated a number of new prospects in California, Nevada, Oregon, Idaho, and some of the Eastern States; magnetic surveys were made in Michigan, near Iron River. The Division of Geophysical Exploration of the Bureau has conducted geophysical surveys in the central region; magnetometer and resistivity surveys were made on magnetite deposits in southwestern and central Missouri, self-potential surveys for zinc in southern Missouri and southwestern Wisconsin, and gravity surveys for zinc in the Tri-State district. The surveys made by private companies are also indicated. (4) Field techniques have shown progress in various respects. (a) Seismic surveying has been reverting to refraction work in areas where reflection shooting offered difficulties; examples are given. (b) Gravity work is increasingly conducted on a regional basis, with attendant advantages in interpretation. (c) Electrical prospecting promises further developments: the Elflex Co. has continued its work with low-frequency transients. (d) Soil analysis has been advanced by S. J. Pirson who reports a discovery made by the improved method in Jack County, Texas. (e) Logging techniques now combine the use of gamma-ray and neutron logs; the temperature log has possibilities in geothermal exploration; the spontaneous-potential dip meter is gaining in application. (5) Material and manpower shortages have retarded progress in geophysical field-work and laboratory research. Material has been insufficient particularly for automotive and drilling equipment. Available manpower has not met the needs of the industry. Though some technicians and research workers were released from certain types of civilian war work by the Government, the number of experienced observers, computers, and party chiefs is still much too small for the expansion demanded by oil consumption and the state of reserves.

Geophysical exploration in the other countries of the western hemisphere has reflected the increased activity in the United States. Various surveys for oil are indicated in Latin America; particular attention is devoted to exploration for metals in Canada. - V. S.

7884. Henney, Keith. Prospecting for Petroleum. Sci. American, New York, vol. 170, No. 5, 1944, pp. 208-210.

A brief review is given of various applications of electronics to prospecting for oil. Electronic prinicples and equipment are used in electrical logging, gamma-ray logging, the tracing of carnotite cement, mud analysis, ultraviolet-light fluorescence techniques, refraction seismograph amplifiers, etc. Moreover, the modern instruments employed in the gravimetric, magnetic, seismological, thermal, and electrical methods usually include some electronic devices. Particularly fruitful are the applications of electronics in reflection seismography. - V. S.

7885. Hügel, Helmut. Orientierte Kerne (Oriented Cores). Oel u. Kohle, Berlin, vol. 38, 1942, pp. 1052-1060.

Oriented borehole cores supply information on the inclination of subsurface layers. There are different methods of orienting cores. The author briefly outlines the mechanical, magnetic, and electrical methods. He then describes in detail his own method developed in the oil fields of Astra Romana in Rumania and used there since 1937. The apparatus is based on a mechanical principle. It consists of pipe which is divided into sections and prevented from rotating. This pipe contains the instruments of orientation and is hung on two rollers in the borehole. The instruments are primarily a pendulum, an orienting magnet, a marking lever, and a releasing clock. The operation of the apparatus is described and clarified by two examples. - V. S.

7886. Illing, V. C. Geophysics Applied to Oil Geology. Quart. Jour. Geol. Soc. London, London, vol. 98, Nos. 391-92, 1943, pp. lxxxv - lxxxvii

Petroleum geology searches for oil-bearing structures by drawing inferences from surface characteristics as to the subsurface configurations. Such inferences are based upon the assumption of a parallelism between the deeper formations and those exposed at the surface. This parallelism does not always hold true. The possibilities of discrepancy make the more direct geophysical methods preferable. Though these methods are usually expensive, oil discovery offsets their costs. The author briefly outlines the main geophysical methods and their uses. He gives examples of oil finding by these methods. - V. S.

7887. Imperial Oil Review. The Search for Oil in Saskatchewan. Toronto, Ontario, vol. 28, No. 2, 1944, pp. 6-9.

In Saskatchewan a heavy overburden covers the bed rock, so that no indications are available regarding the subsurface. The Imperial Oil Co. of Canada has sent repeatedly geological parties for oil prospecting, but they were unsuccessful. In 1940 exploration was expanded to include gravimetric, seismic and core-drilling work. (1) The gravimetric surveys covered nearly 11 million acres during 1940-41, but they were found unsuited for the Saskatchewan subsurface and have been discontinued. (2) The seismic method proved to be more promising, and some 5 million acres had been surveyed to the end of 1943; this work is continued. (3) The study of cores has included drilling, laboratory analysis, and an examination of the available logs of the water wells in Saskatchewan. This combined exploration has covered 54,600 sq. miles in 3 years and brought to light a number of areas favorable to the accumulation of oil. The surveyed regions are shown on maps. The Imperial Oil Co. and the Norcanols Oil & Gas Co. have taken leases. Eight holes have been drilled by them. In no instance has production been obtained. - V. S.

7888. Krynine, P. D. The Future of Oil Finding. Oil Weekly, Houston, Tex., vol. 116, No. 7, 1945, pp. 26-30.

In Pennsylvania a vast majority of oil fields is of the petrological type, usually termed "stratigraphic trap". Such oil occurrences are related to primary sedimentary processes, and little is known about finding them. At the Pennsylvania State College the problem of search has been approached through studies of the fundamental principles of sedimentology. The author discusses the results of these investigations. He finds that there exists a direct connection between large accumulations of oil and certain sedimentary processes forming end-phase concentrates. These processes leave on the rocks many imprints besides producing oil. Accordingly, the imprints can be used as oil-finding criteria in prospecting for oil. The nature of such petrological criteria is briefly indicated. - V. S.

7889. Nature. Geophysical Exploration in Canada and the United States. Nature, London, vol. 153, No. 3886, 1944, pp. 503-504.

Geophysics is used for exploring the subsurface at depths inaccessible to geology. Such surveying is cheaper than exploratory drilling. The progress achieved during 1924-39 in the use of four geophysical methods - seismic, magnetic, gravimetric, and electric - is briefly indicated. The principal areas surveyed in the United States and Canada are specified. - V. S.

7890. Northern Miner. How to Claim Allowances for Geophysical Work. N. M., Toronto, vol. 30, No. 39, 1944, p. 6.

The Department of Mines for Ontario has issued instructions regarding submission of the results of geophysical exploration, as required under section 78 (11) of the Mining Act. In claiming allowances of assessment on the basis of geophysical expenditures, the mining companies and licensees are required to present to the Department: (1) Receipts for expenditures; (2) maps of the claims on which the work was done; (3) contour and profile maps of geophysical results; and (4) interpretation and correlation of results. The purpose is to stimulate geophysical exploration. All the material will be kept on file at the Department in Toronto. - V. S.

7891. Northern Miner. Seven Years' Geophysical Work in Ontario Reviewed. Toronto, vol. 30, No. 39, 1944, p. 11.

A review is presented of the geophysical work conducted by the Ontario Department of Mines from 1937 to date. The magnetic, electrical resistivity, self-potential, and gravitational methods were employed. Exploration centered in the areas of Pickle Lake, Steeprock Lake, Little Long Lac, Madoc, Kirkland-Larder, and Southwestern Ontario. The review outlines the nature of the work, gives conclusions as to what geophysical methods may do, and advances suggestions as to how they may be developed and applied. In conclusion, the author makes a résumé of the general status of geophysical methods, indicating their advantages, limitations, and the possible remedies. - V. S.

7892. Oil and Gas Journal. England's Only Oil Field Is Most Strategically Located Allied Supply. Tulsa, Okla., vol. 43, No. 34, 1944, pp. 253-255.

In May 1939 an oil deposit was discovered in Lancashire, England. The initial clue came from outcroppings in a nearby colliery. A geophysical investigation of the area showed favorable anticlinal conditions. This discovery was made after extensive geophysical exploration in England, and it has lead in turn to more exploration. The seismic method was the one generally employed. The area surveyed during the war period has amounted to 1,300 square miles. - V. S.

7893. Ospina-Racines, E. Colombia Entering New Era of Widespread Exploration. World Petroleum, New York, vol. 15, No. 10, 1944, pp. 61-65.

The author describes the present development of oil exploration in Colombia. Surface and geophysical prospecting has been carried out in all the promising oil areas of the country. Currently, the Tropical, Shell, Texas, Socony, Richmond, and Gulf Companies are making surveys in the Llanos, Caribbean and Mid-Magdalena oil districts. Eight seismic crews, one magnetometer crew, and three gravimeter crews are operating in the field. The recent work includes a gravimetric survey of the southern part of the Pacific coast from the Ecuadorean border to the Patia River; further work is scheduled in the northward direction. A map is given of the distribution of oil fields in Colombia. - V. S.

7894. Rohr, K. Oriented Hand Coring in Geological Field Work. Jour. Inst. Petrol., London, vol. 30, No. 244, 1944, pp. 81-89.

The use of oriented hand coring improves exploration techniques because it provides factual checks on them. A successful application of augering was made by V. C. Illing and H. G. Kugler in 1920, in the course of exploratory mapping of oil districts in Trinidad. A specially designed equipment for oriented hand coring has been introduced by the author in 1941. Its several parts are described. The coring instrument proper consists of an outer string, an inner string, and a core-barrel assembly. The accessories include a core extractor and a table for core orientation. This equipment is used with augering tools comprising a 1-3/4-inch-diameter auger bit run on a 3/4-inch pipe. The coring procedure involves lowering the coring instrument oriented northward into the auger hole, coring the bottom by strokes with the upper link of the drive rod, recovering the core without disturbing its orientation, and preparing the core for determination of strike and dip. The efficiency, costs, labor, and advantages of hand coring are indicated. - V. S.

7895. Sawdon, W. A. Colombia Is Active Both in Development and Exploration. Petrol. Eng., Dallas, Tex., vol. 16, No. 1, 1944, pp. 78-81.

Geophysical work in Colombia is done at present by the Tropical, Shell, Socony-Vacuum, Richmond Petroleum of Colombia, and Texas Companies. The Gulf interests are contemplating immediate seismograph surveys. Several other companies are expected to do geophysical exploration in the near future. Generally, the regions to be surveyed include the llanos areas in the south and the northern areas where all commercial production to date has been obtained. - V. S.

7896. Science. The Institute of Geophysical Technology at St. Louis University. Lancaster, Pa., vol. 100, No. 2604, 1944, p. 466.

The Institute of Geophysical Technology at St. Louis University is organized as an autonomous school. Its curriculum has three distinct levels: (1) In the lower division, 2 years are devoted to a single program in the basic sciences and engineering; (2) in the upper division, specialized programs are offered for the bachelor's degree in the fields of petroleum geophysics, mining geophysics, seismological engineering, geological engineering, radio communications engineering, applied electronics, and professional meteorology; (3) on the graduate level, research and advanced study lead to the master's and doctor's degrees in these fields, under the auspices of the Graduate School of the University. - V. S.

7897. Shaw, Herman. (1) Report on Preliminary Visit of Inyaminga, dated September 1936. (2) Geophysical Survey of the Southeastern Area, Report dated February 1937. (3) Supplementary Notes on the Gradiometer Survey at Inyaminga During 1934, dated March 1937. (All deposited in typewritten form in the library of the Geological Survey, Washington, D. C.)

The author analyzes the evidence gathered by surveys in the Inyaminga (Inhaminga) Petroleum Concession of the Mozambique Co., Portuguese East Africa, and makes recommendations for further exploration. (1) In the first report, former exploratory data are reviewed, and the Southeastern Area of the concession is found suitable for gravitational and seismic surveys; magnetic trial traverses are also advised. (2) In the second report, the results of the magnetic and seismic work made in the Southeastern Area in 1936 are examined. Recommendations are made for a magnetic survey of the previously discovered anomaly and of other locations, as well as for a gravimetric survey of the anomaly. (3) In the Notes, the previous gradiometer evidence of O. Weiss on the Inyaminga structure (see No. 7800 of this issue) is examined, and expanded gravimetric exploration of this structure is advised, in combination with a magnetic survey. - V. S.

7898. Shepherd, G. F., and Atwater, G. I. Geologic Use of Drilling-Time Data Oil Weekly, Houston, Tex., vol. 114, 1944, No. 5, pp. 17-24, No. 6, pp. 38-46.

Drilling time can be used as an aid in coring, sample logging, and determining permeable streaks in limestones. Experience has shown that lithology is the controlling factor in the rate of penetration; mud characteristics, rotary speed, drilling weight, type of bit, and other variables have a slight effect on the curve of relative speed. The more fully automatized the recording is, the better will be the log. The author has studied the drilling of 28 wells made with a semi-automatic recorder; total footage exceeded 138,000 feet. He discusses subsurface control from drilling time, correlation between drilling-time logs, control of directional holes, drilling time applied to coring, working out completion programs, determination of sample lag, measurement problems, hypothetical electric-log construction, and the limitations of drilling-time logs. Samples of logs illustrate the text. - V. S.

7899. Stetson, H. C. Oceanography. Annual Report of the Board of Regents of the Smithsonian Institution, 1943; Washington, D. C., 1944, pp. 219-244.

In discussing the progress of oceanography the author dwells on submarine geology and marine surveying. Magnetic, gravimetric, and seismic exploration and bottom sampling are briefly outlined. A bibliography is appended. - V. S.

7900. Turechek, G. F. More About Powder and Ballistics, Parts I-III. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 10, 1944, No. 2, pp. 12-13, 34, No. 3, pp. 14-15, 34, No. 4, p. 29.

This series of articles discusses briefly powder and interior ballistics in connection with gun-perforating operations in cased wells. Part I deals with powder grain-sizes, their application, and general powder specifications. Part II discusses the composition and characteristics of powders, their burning time, and the gun. Part II treats of the combined functioning of various elements in a gun-perforating operation and touches briefly on interior ballistics. - V. S.

7901. Weller, J. M. Petroleum Possibilities of Red Basin of Szechuan Province, China. Bull. Am. Ass. Petrol. Geol., Tulsa, Okla., vol. 28, No. 10, 1944, pp. 1430-1439.

The Red Basin of Szechuan Province contains a thick series of Mesozoic and possibly Tertiary redbeds which overlies Triassic marine limestone and a largely unknown succession of Paleozoic formations. Many anticlinal folds are known, and oil is present in small amounts at several seepages and in numerous wells drilled for brine. Prospects for production from the "Red Beds" do not appear to be good. The Triassic limestone does not contain oil in commercial quantities on one well formed anticline, but it has been tested at only one other locality. Possibilities of the underlying Paleozoic beds, particularly the Permian which probably occurs throughout the basin, are worthy of careful consideration. - Author's abs.

7902. Yacimientos Petroliferos Fiscales, Direccion General (Argentina). Memoria correspondiente al ano 1942 (Annual Report of the Argentine Administration of Government Oil Fields for 1942). Buenos Aires, Guillermo Kraft Ltda, 1943, pp. 25-31.

A section of this report is devoted to geophysical exploration. This work was carried out during 1942 in the Argentine provinces of Cordoba, Mendoze, Salta, San Juan, Chaco, Chubut, Santa Cruz, Neuquen, and Rio Negro. As in previous years, gravitational and magnetic methods were used for broad surveying, while the seismic method was employed for more detailed investigation. The work is described by provinces; statistics of explored areas are given, maps are appended, and comparisons are made with the data for 1941. - V. S.

9. NEW PUBLICATIONS

7903. Beringer, C. C. Geologisches Wörterbuch (Geological Dictionary), 2d ed. Stuttgart, F. Enke Verlag, 1943, 154 pp. Price, 6.60 RM.

This German dictionary gives definitions and explanations of terms in the field of geology, paleontology, mineralogy, mining, soil science, etc. In many cases the explanations are comprehensive and illustrated by examples. The second edition has been enlarged by the addition of new terms. - V. S.

7904. Engeln, O. D. von. Geomorphology, Systematic and Regional. New York, Macmillan Co., 655 pp., 380 illustrations. Price, $4.50.

Information is presented on land forms useful in problems dealing with ore and oil deposits, nature of bedrock, depth of soil, rock layers, etc. The test covers relief features, geomorphic units, geomorphic cycles in different locations, the peneplain concept, rock strength, weathering, mass translocations, dome and fold structures, faulting, land forms from volcanicity, etc. - V. S.

7905. Mathematical Tables Project, Work Projects Administration of the Federal Works Agency, U.S.A. Tables of Lagrangian Interpolation Coefficients. Conducted under the Sponsorship of the National Bureau of Standards; A. N. Lowman, Technical Director. New York, Columbia University Press, 1944, 392 pp. Price $5.00.

In mathematical solutions of problems it is often necessary to approximate complicated functions by polynomials or trigonometric sums. The principles of such approximation are embodied in the theory of polynomial or trigonometric interpolation, of which the Lagrangian interpolation formula is a fundamental expression. The present volume extends the few existing tables of Lagrangian interpolation coefficients by giving the entries at smaller intervals of the argument and by making adequate provisions for interpolation near the beginning and the end of a table. The tables cover (1) Lagrangian Interpolation Coefficients, and (2) Lagrangian Integration Polynomials and Coefficients. Introductory remarks deal with properties of Lagrangian interpolants, errors in interpolation, relation between Lagrangian interpolants and the coefficients of difference formulas, and numerical integration. A bibliography is included. - V. S.

7906. Reich, H., and Zwerger, R. von, Editors. Taschenbuch der Angewandten Geophysik (Pocketbook of Applied Geophysics). Leipzig, Becker & Erler, 1943.

This pocketbook presents the information required by geophysicists in practical work. At the beginning are given mathematical and physical tables and formulas. There follows a comprehensive treatment of the gravimetric, seismic, magnetic, electric, radioactive, and thermal methods. Theoretical considerations are avoided; instead, a bibliography of related literature is provided. A detailed subject index facilitates the use of the information. - V. S.

10. PATENTS

7907. Well Surveying Method and Apparatus; R. E. Fearon, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,351,028, issued June 13, 1944.

A method of determining the nature of substances that comprises deriving from individual quanta of gamma rays emanating therefrom an ionization proportional to the energy in each quantum, separately converting the ionization caused by each quantum into an electrical impulse, amplifying, and recording the magnitude of the current corresponding to each quantum, separately. - Claims allowed, 6.

7908. Seismic Prospecting; N. H. Ricker, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,351,456, issued June 13, 1944.

In seismic prospecting in which seismic waves are introduced into the ground at a selected point, received at other points selected in the path of said waves from substrata and converted into electrical impulses, the steps which comprise amplifying the different frequencies of said impulses to a different degree proportional to the absorption of said frequencies by the earth while maintaining the phase relationship between said frequencies, and recording the amplified impulses. - Claims allowed, 5.

7909. Method of Seismic Prospecting; R. L. Lay, B. H. Treybig, Jr., and L. M. Hubby, Houston, Tex., assignors to Texaco Development Corporation, New York, N. Y., a corporation of Delaware. U. S. Patent 2,351,524, issued June 13, 1944.

In the process of seismic exploration in which the firing of a charge of explosive placed below the surface of a body of water is used to generate seismic waves, the method of preventing the occurrence of secondary P waves when the charge is exploded which comprises correlating the amount of the charge, the strength of the explosive, and the depth of the charge in the body of water so that the explosive force of the charge when fired is just sufficient to blow out the water above the exploding charge, placing the charge of explosive at the predetermined depth, and firing the charge to generate seismic waves. - Claims allowed, 3.

7910. Gravity Meter; Anton Graf, Berlin-Steglitz, Germany; vested in the Alien Property Custodian. U. S. Patent 2,351,955, issued June 20, 1944.

A gravity meter comprising in combination a casing for the meter, a mass mounted within the meter casing for vertical displacement, spring means balancing the gravity force of said mass, an optic-electric cell system for converting light variations into electric values, said system including two cell units, a first light source emitting light towards one cell unit, a second light source emitting light towards the other cell unit, a first diaphragm arranged in each of the light paths, a second diaphragm arranged in each of the light paths and located in front of said first diaphragm, each diaphragm having apertures which permit light from the source associated therewith to pass therethrough towards the cell unit associated with the diaphragm, means for mounting said first diaphragms whereby they are adjustable in a substantially vertical direction and are adjustably turnable about a substantially horizontal axis, said second diaphragms being arranged to be displaced with said mass in such manner that upon a displacement of the mass the quantity of light reaching one of the cell units increases while the quantity of light reaching the other cell unit decreases, indicating means operatively connected to said cell system to indicate the difference between the measuring values of said two units, said two cell units being arranged back to back in spaced relation in the center of the meter casing, said meter casing being provided with openings, one for each light source, a separate lamp casing arranged outside of the meter casing opposite each opening in the meter casing the means for mounting one of said light sources in each lamp casing whereby the light source is substantially vertically displaceable relative to the first diaphragm associated therewith. - Claims allowed, 5.

7911. Thermal Well-Logging; L. W. Blau and G. E. Cannon, Houston, Tex., assignors to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,352,247, issued June 27, 1944.

A method for determining the nature of substrata traversed by a borehole filled with a fluid which comprises measuring the horizontal temperature gradient between the center and the wall of the borehole at successive points along the borehole. - Claims allowed, 3.

7912. Well Logging; Gerhard Herzog, Houston, Tex., assignor to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,352,433, issued June 27, 1944.

A method of determining the stratigraphy of the formations adjacent a well bore, which comprises inserting into a well bore an instrument adapted for use in the determination of the characteristics of the surrounding formations, passing the instrument through the formations of which information is desired while continuously recording the characteristics thereof, reversing the motion of the instrument, repassing the instrument through the said formations while continuously recording the characteristics thereof, and subtracting one of the two records obtained from the other record. - Claims allowed, 3.

7913. **Seismic Surveying**; J. O. Parr, Jr., San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,352,494, issued June 27, 1944.

An amplifying system for amplifying a train of waves extending over a period of several seconds and in which the first part of the train has a general amplitude level several times greater than that of the remainder and in which the general level of the remainder gradually decreases, the combination with a seismometer for converting incoming seismic energy into electrical wave form signals, and means for amplifying and recording such signals, said amplifying means including at least one thermionic valve amplifier, of a thermionic control valve for applying to a control grid of said valve amplifier a more negative bias in response to increase in amplitude of incoming energy above a predetermined amplitude, means normally biasing the grid of said control valve beyond cut-off, means applying to the grid of said control valve a bias derived from the incoming energy of such value as to render the grid potential less negative than said normal bias when said energy exceeds said predetermined amplitude, and means automatically operable before the major portion of the wave train has been received to gradually render said normal bias more negative toward the end of the period of arrival of the train to effect a corresponding increase in said predetermined amplitude independent of subsequent incoming energy said last named means acting over the major portion of the period of arrival of the train. - Claims allowed, 4.

7914. Seismograph Amplification Gain Control; C. H. Fay, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,352,825, issued July 4, 1944.

In a method of seismic exploration, the steps of generating electric impulses, amplifying in parallel each of said impulses throughout symmetrical portions of its cycle, combining the symmetrically amplified impulses, rectifying said impulses, causing a potential variation between an initial and a final value throughout a period of time, controlling the rate of change of said potential variation as a function of said rectified impulses, and controlling the parallel amplification of said impulses by symmetrically applying thereto said controlled potential variation. - Claims allowed, 2.

7915. Seismic Surveying; J. F. Tolk, San Antonio, Tex., assignor to O. S. Petty, San Antonio, Tex. U. S. Patent 2, 352,869, issued July 4, 1944.

In a method of seismic surveying which involves firing an explosive charge to create seismic waves in the earth, detecting said waves at a plurality of remote points, converting the same to separate electrical wave form signals, and amplifying and recording such signals, the steps which comprise causing the electrical wave form signals from each such point to flow through two separate paths, filtering the signals in one only of such paths to emphasize a restricted band of frequencies, and separately and simultaneously recording the signals flowing in both paths. - Claims allowed, 9.

7916. Radiological Method of Logging Wells; M. M. Albertson, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware.- U. S. Patent 2,352,993, issued July 4, 1944.

In a method for logging boreholes by means of a detector responsive to radio-active phenomena, the steps of introducing into a borehole and forcing into a formation zone adjacent the borehole a liquid comprising a radioactive tracer material, subsequently withdrawing said liquid from the borehole proper, lowering said detector into the borehole, and indicating the radioactive effects to which said detector is subjected by reason of the presence of a portion of said material in said formation zone. - Claims allowed, 12.

7917. Seismic Exploration Method; Eugen Merten and J. P. Woods, Houston, Tex., assignors to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,353,484, issued July 11, 1944.

In a method of geophysical exploration wherein seismic waves are translated into electric impulses and recorded, the steps of generating said seismic waves by confining a uniformly distributed explosive charge over a substantially horizontal ground area, the measurement of said area in at least one horizontal direction being at least one-tenth of the vertical distance between said area and the nearest reflecting underground layer, and exploding said charge. - Claims allowed, 2.

7918. Geophysical Prospecting; Bruno Pontecorvo and Gilbert Swift, Tulsa, Okla., assignors to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,353,619, issued July 11, 1944.

Apparatus useful in geophysical prospecting within a well bore that comprises a radiation detector, means for suspending said detector within a well bore, a radiation source, and means for freely suspending said source within the well bore in spaced relationship relative to the detector, said means having sufficient flexibility that the detector can move within the bore hole into close proximity to said source. - Claims allowed, 12.

7919. Contractor-Expander for Electric Seismographs; J. P. Minton, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,354,420, issued July 25, 1944.

In an electric seismograph having a vacuum tube amplifier having at least two gain-control grids, a geophone connected to the input of said amplifier, a recording galvanometer connected to the output of said amplifier, means operable upon production of seismic waves for generating a signal, and means actuated by the signal for gradually and concurrently varying the grid potential in opposite directions on at least two grids in at least one of the tubes in the vacuum tube amplifier to effect a corresponding contraction and thereafter an expansion in amplification by the amplifier at such a rate that all phases of the record made by said recording galvanometer are of usable amplitude. - Claims allowed, 9.

7920. Electrical prospecting; Gary Muffly, Penn Township, Allegheny County, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U. S. Patent 2,354,535, issued July 25, 1944.

A method of locating electrically nonlinear earth stratum interfaces comprising passing alternating current of a single frequency through the earth, exploring for at least one harmonic of said frequency generated by passage of said current through an interface and selectively detecting said harmonic. Furthermore, a method of locating a stratum interface having nonlinear electrical impedance characteristics comprising passing two alternating currents of different frequency through the earth, exploring for at least one side band resulting from modulation of one of said frequencies by the other in passing through an interface and selectively detecting said side band. - Claims allowed, 22.

7921. Seismic Prospecting; N. H. Ricker, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,354,548, issued July 25, 1944.

A method for the investigation of earth substrata which comprises establishing a disturbance point in the area to be investigated, creating a seismic disturbance at the disturbance point, establishing a reception point for seismic waves at each of a plurality of spaced points removed from the disturbance point but sufficiently close to this point to receive energy from said disturbance, and receiving at each reception point and recording as a function of time, shear waves generated by the reflection of a compressional wave from reflecting layers in said earth substrata. - Claims allowed, 10.

7922. Seismic Surveying; W. O. Bazhaw and J. O. Parr, Jr., San Antonio, Tex., assignors to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,354,659, issued August 1, 1944.

A method of geophysical exploration for use in the location of subterranean porous formations permeated by fluid, comprising the steps of propagating seismic waves beneath spaced points in the vicinity of the earth's surface, whereby the fluid is subjected to pressure and caused to flow within the porous formation, detecting the potential difference developed between such points by electric current flow resulting from such fluid flow and amplifying and recording the potential difference. - Claims allowed, 2.

7923. Gravity Meter; D. H. Clewell and H. A. Maeder, Dallas, Tex., assignors to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New Yord. U. S. Patent 2,355,421, issued Agust 8, 1944.

A force measuring device comprising in combination, a housing, a support within said housing secured thereto, a mass, means for pivotally securing the mass to the support for rotation in a vertical plane, means secured to the mass for elastically balancing the effect of gravitational forces on said mass, means for securing said elastically balancing means to the support, said means comprising a pair of slides, common means for adjusting one of said slides and locking it in adjusted position, and means for observing the position of the mass relative to the housing and support, whereby changes in the position of the mass due to the action of gravitational force thereon can be measured. - Claims allowed, 17.

7924. Seismic Prospecting; J. A. Sharpe, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,355,826, issued August 15, 1944.

Apparatus for the determination of a transmission characteristic of the weathered zone below a seismic recording station comprising a source of seismic waves positioned at one boundary of said weathered zone, a seismometer positioned at the other boundary of said weathered zone and approximately vertically located with respect to said source of seismic waves, means determining a characteristic of said seismic waves at said source, and means for comparing said characteristic with the corresponding characteristic of the output from said seismometer. - Claims allowed, 5.

7925. Method of and Apparatus for Firing Gun Perforators; R. M. Otis, Pasadena, Calif., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware. U. S. Patent 2,356,082, issued August 15, 1944.

A method of firing a gun perforator in a well, characterized by: Generating adjacent the top of said well an elastic vibration; acoustically transmitting said vibration adjacent said gun perforator; and initiating operation of said gun perforator in response to said picked-up vibration. - Claims allowed, 18.

7926. Retrievable Gun Perforator; E. F. Raymond, Los Angeles, Calif. U. S. Patent 2,356,431, issued August 22, 1944.

A retrievable gun perforator for use in wells, comprising a body movable downwardly along a cable lowered in the well in advance of the perforator, a gun unit within the body, and means for interconnecting the body and cable at different locations along the cable to permit removal of the perforator on the cable from different depths at which the perforator may become lodged in the well. - Claims allowed, 14.

7927. Method and Apparatus for Conducting Different Investigations Simultaneously in Boreholes; H. G. Doll, Paris, France, assignor, by mesne assignments, to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,357, 177, issued August 29, 1944.

A method of simultaneously investigating electrical characteristics at different depths of investigation of the formations surrounding a borehole, comprising the steps of simultaneously generating in the borehole a plurality of alternating currents of different frequencies, passing all of said generated currents through the adjoining formations by applying them to the formations in such a way as to be differently affected by electrical characteristics of the formations at different depths of investigation, obtaining electrical values from said respective current resulting from their passage through said formations, which values are functions of the electrical characteristics of the formations at different depths of investigation, respectively, combining said electrical values to a single electrical circuit, and obtaining therefrom at the surface of the earth, separate simultaneous indications of said electrical values. - Claims allowed, 13.

7928. Method and Apparatus for Investigating Boreholes; H. G. Doll, Paris, France, assignor, by mesne assignments, to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,357,178, issued August 29, 1944.

A method of simultaneously investigating electrical characteristics at different depths of investigation of the formations surrounding a bore hole, comprising the steps of generating electrical current of given character at the surface of th earth, transmitting said current of given character through a single electrical circuit to a given location in the bore hole, converting said current of given character at said location to a plurality of alternating currents of different frequencies which are different in character from said current of given character, simultaneously passing all of said converted alternating currents of said different frequencies through the adjoining formations by applying them to the formations in such a way as to be differently affected by electrical characteristics of the formations at different depths of investigation, obtaining electrical values from said respective currents of different frequencies resulting from their passage through said formations, which values are functions of the electrical characteristics of the formations at different depths of investigation, respectively, combining said electrical values, applying said combined electrical values to said single electrical circuit, and obtaining therefrom at the surface of the earth separate simultaneous indications of said electrical values. - Claims allowed, 11.

7929. Inductive-Capacitive Electrical Logging; M. C. Bowsky, Houston, Tex., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware. U. S. Patent 2,358,441, issued September 19, 1944.

A method of electrically logging well bores characterized by: establishing an alternating current field in the formation traversed by a well bore; establishing a probe circuit for electrically sampling said alternating current field; commutating the alternating current in said probe circuit in a manner to render the reversal of the probe current by commutation approximately 90 electrical degrees out of phase with respect to the alternating current potential as applied to the formation; moving the pick-up portion of the probe circuit to a different location and measuring algebraically the resultant voltage, to detect shifting of the phase of the alternating current in the formation due to inductive or capacitive characteristics of the formation at said different location. - Claims allowed, 3.

7930. Gamma Ray Well Logging; L. G. Howell, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,358,574, issued September 19, 1944.

A method for producing a log of the gamma-ray activity of formations penetrated by a borehole which comprises moving along the borehole an ionization chamber capable of generating current in response to gamma ray bombardment, of a size proportional to the gamma-ray intensity, converting said current into a pulsating current of an amplitude proportional to the gamma ray intensity and of a selected frequency wholly independent of gamma-ray intensity, transmitting said pulsating current to the surface, amplifying it, and recording it. - Claims allowed, 18.

7931. Method of Determining the Porosity and Location of Permeable Formations in Oil Wells; C. F. Teichmann, Mount Vernon, N. Y., assignor to Texaco Development Corporation, New York, N. Y., a corporation of Delaware. U. S. Patent 2,358,945, issued September 26, 1944.

The method of determining the presence and location of permeable formations surrounding a borehole which comprises treating the filter cake deposited on the walls of the hole to render said filter cake permeable, circulating a solution of a radioactive substance into said hole, applying pressure to the solution to force it through the filter cake and into permeable formations surrounding the hole, removing from the hole the solution not absorbed by the formations and then passing an instrument through the hole to detect the radioactivity of the surrounding formations. - Claims allowed, 8.

7932. Method of Well Core Investigation; E. D. Lynton, Glendale, Calif., assignor to Standard Oil Co. of California, San Francisco, Calif., a corporation of Delaware. U. S. Patnet 2,359,135, issued September 26, 1944.

A method of investigating well cores, including determining indications of stratification on the surface of a well core comprising the steps of viewing said core under light of a wave length which is outside the visible spectrum and which will cause one or more stratified and segregated components of said core to become visible, and correlating said stratification indication with the orientation of said core. - Claims allowed, 6.

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